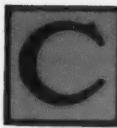


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N. A. Wood.

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A Magazine of Western
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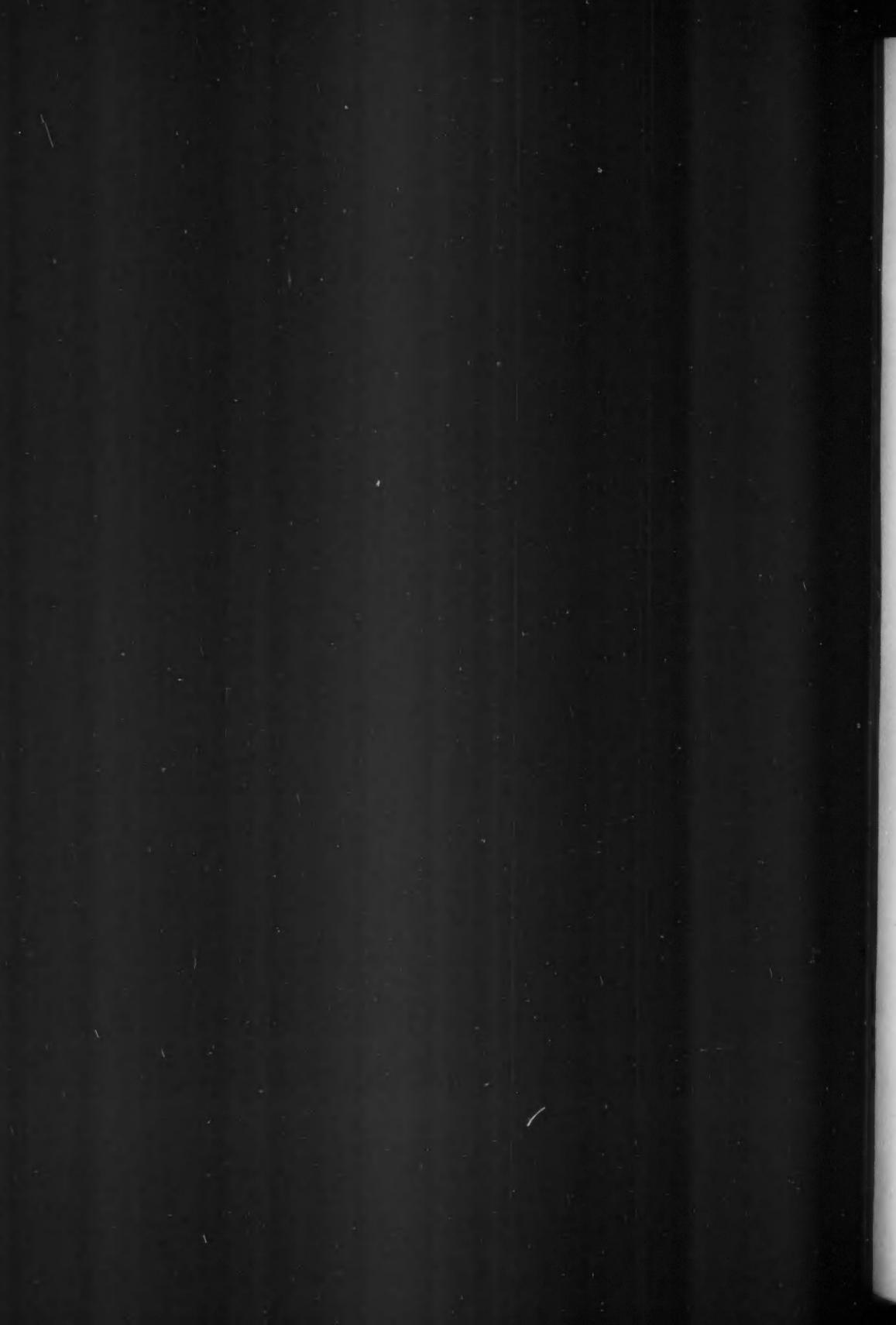
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CONTENTS

	PAGE
Habits and Nest Life of the Desert Horned Lark (with five ill.)	A. Dawes DuBois 49
Three Broods of Red-backed Juncos in One Season	Lyndon L. Hargrave 57
Nesting of the Bonaparte Gull in British Columbia (with one ill.)	J. A. Munro 60
Viability of Weed Seeds after Ingestion by California Linnets	Elizabeth S. Roessler 62
Taxonomic Comments on Red-tailed Hawks (with map)	P. A. Taverner 66
Eating Habits of Falcons with Special Reference to Pellet Analysis	Richard M. Bond 72
Status of the Cormorants of Great Salt Lake (with two ill.)	William H. Behle 76
Up-hill Planters	Joseph Grinnell 80
Summer Notes from Plumas County, California	Joseph Ewan 82
FROM FIELD AND STUDY	
Speed and Eyesight of a Pigeon Hawk	Richard M. Bond 85
The Brown Thrasher in Utah	Henry Grantham 85
New Nesting Records for Yosemite Valley	Charles W. Michael 85
Broad-winged Hawk in Idaho	William B. Davis 86
A Northwestern Robin Reaches California	J. Grinnell 87
Occurrence of the Red-naped Sapsucker in Santa Cruz County	Paul F. Conel 87
The Rusty Blackbird in Western Montana	Winton Weydemeyer 87
Shrike Craftiness	Ruth M. Crockett 88
Northern Records of the Mockingbird	Laurence B. Potter 88
The Little Blue Heron at Santa Cruz, California	D. E. Danby 88
Fall and Winter Records from the Coachella Valley, California	Ben Clary and Marjorie Clary 89
Golden-crowned Sparrow in Zion National Park	W. S. Long 89
Red-shafted Flickers Feeding on Aphids	Jack C. von Bloeker, Jr. 90
The Range of the Sharp-tailed Grouse in New Mexico	Alexander Wetmore 90
NOTES AND NEWS	
Herbert Friedmann (portrait)	91
MINUTES OF COOPER CLUB MEETINGS	
	92

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.
21.
22.
23.
24.
25.
26.
27.
28.
29.
30.
31.
32.
33.
34.
35.
36.
37.
38.
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86.
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88.
89.
90.
91.
92.



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VOLUME XXXVIII

MARCH-APRIL, 1936

NUMBER 2

HABITS AND NEST LIFE OF THE DESERT HORNED LARK

WITH FIVE ILLUSTRATIONS

By A. DAWES DU BOIS

These notes were first written a number of years ago. In the meantime an exhaustive study of the horned larks of the closely allied race *Otocoris alpestris praticola* has been made by Dr. Gayle B. Pickwell (Trans. Acad. Sci., St. Louis, 27, 1931, 153 pp.). There is probably little that is now really new in the time-worn notes here presented, but they do indicate conditions peculiar to the Montana prairies. The observations, necessarily casual, were made in Teton County, Montana, beginning in the fall of 1914. The nests that were found there during four nesting seasons were described in detail in the *Condor* for March, 1935 (37, pp. 56-64).

Horned Larks were present in Teton County throughout the winter, though the species was much less abundant at that season than in summer. The majority of the wintering larks were probably visitants from a region where the summer ranges of the Desert and Pallid horned larks overlap, rather than typical birds of either race. Possibly some of them were intergrades of *O. a. arcticola*, *O. a. leucolaema* and *O. a. hoyti*; but typical individuals of the Desert race were undoubtedly present in midwinter. During the month of February (1916) birds were observed with all degrees of throat coloring, from bright yellow to pure white.

The dates of fall migration are difficult to determine. It seems probable that the larks continue to move slowly southward as long as the mercury continues to descend; and if this is so, it brings the wintering birds gradually from farther north to replace, though in less numbers, the departing summer residents. On the return migration the north-bound birds arrive in flocks early in March and soon become common.

Whatever may be the status of the intermingled races at other seasons of the year, it is the Desert race (*Otocoris alpestris leucolaema*), breeding on the Teton slope south of the Teton River, with which the following observations are concerned. My cabin there was one more human habitation thrust among them on their ancient nesting ground—a short-grass area of high, dry bench-lands.

The larks, being strictly ground birds, are walkers and runners; they never hop. They walk with surprisingly long strides, as evidenced by their footprints in the snow. They run along a prairie road ahead of any human wayfarer who may happen to be traveling there. When standing on the ground, especially when feeding, they persistently keep their earth-colored backs turned toward the human observer so that it becomes quite difficult to obtain a front view of them. They have a way of standing as high as possible on their legs and stretching up their necks to look about.

They take their dust baths on the little bare spots in the prairie sod. They sleep on the ground; I often flushed them from their roosting places after dark. Frequently they alight on a stone or other slight elevation; and, with the coming of the settlers, they avail themselves of the higher lookouts afforded by the flat tops of the fence posts. They undoubtedly destroy quantities of weed seeds; and in the nesting season they feed larvae to their young.

The song of the Desert Horned Lark is so cheerful and hearty that it is always a welcome sound. There are two common forms of song. The first and more musical of these bears some resemblance, in its general form, to the song of the Dickcissel. It is commonly heard throughout the day. The other is a "chattering song" which sounds like a series of alternate inhalations and exhalations, the notes being similar to the first notes of the Dickcissel song. When they fly, the larks usually utter a song, and they have a call, somewhat similar to the traveling notes of the goldfinch, which they sing out when traveling on the wing. At dawn and after sunset, the singers join in a general chorus. There are times of atmospheric calm when the singing of many birds in concert must surely arrest the attention and stir the fancy of any prairie dweller. One evening in April there was such a special occasion, when no other sound came over the prairie, and the larks were singing everywhere. They all poured forth their "chattering song." It was past sunset and they continued to sing through the dusk until almost dark, the chorus then gradually subsiding.

The springtime ceremonies of the horned larks are especially interesting by reason of the aerial maneuvers performed by the birds. The most remarkable of these maneuvers is the song flight, in which the male bird rises to such a height that he is barely visible as a speck in the sky. The ascent is not a uniform flight but is rather, a series of steep rises, with rapid wing beats, alternated with brief coasting intervals during which the wings are closed. It proceeds, usually, in the course of a wide helix, thus carrying the bird slowly around in the arc of a circle as viewed from beneath;

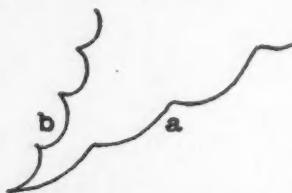


Fig. 8. Diagram illustrating variations of steepness of ascent in the song flight of the Desert Horned Lark: (a) usual course; (b) course against a strong wind.

but sometimes when a strong wind is blowing, the bird faces continuously against it, and the resultant course may then be almost vertically upward. The steepness of the stairs he climbs depends upon the wind, and probably also on the bird's experience and individual preference (see fig. 8). As he continues to mount higher and higher he occasionally utters his song. The aerial song is commonly the one having the form of the Dickcissel ditty, but sometimes both that form and the "chattering" form of song are employed while the bird is at his greatest height.

After remaining aloft for a time, singing his best song, which comes to the human ear but faintly with ever increasing velocity he descends until one might fear for his life; but he spreads his wings just in time to avert a violent end, skillfully turning his course into a glide which carries him horizontally, near the ground, until his momentum has been spent. He then alights quite easily, as though nothing important had happened. The velocity of the vertical descent is so great that it produces a distinctly audible sound. By looking quickly, upon hearing the whiz of a diving lark, it is possible to see the bird on the final glide. I doubt that the bird world holds a more awe-inspiring event than this headlong drop from the sky. It far surpasses the perform-

from so great a height, the bird suddenly folds his wings and drops like a bullet. With ever increasing velocity he descends until one might fear for his life; but he spreads his wings just in time to avert a violent end, skillfully turning his course into a glide which carries him horizontally, near the ground, until his momentum has been spent. He then alights quite easily, as though nothing important had happened. The velocity of the vertical descent is so great that it produces a distinctly audible sound. By looking quickly, upon hearing the whiz of a diving lark, it is possible to see the bird on the final glide. I doubt that the bird world holds a more awe-inspiring event than this headlong drop from the sky. It far surpasses the perform-

ance of the nighthawk, though the nighthawk's dive ends with a "boom," while the final glide of the lark is silent. The song flight is not confined to any particular time of day. It may be witnessed occasionally in the evening.

One March day, the 10th, I watched what seemed to be the practice of an inexperienced youth. Mounting only about as high as the longspurs, he maintained this elevation, repeatedly singing the usual song and occasionally pretending to make a dive, which was no more than a little swoop. After practicing thus for a time he mounted about half as high as the experts go, made several false swoops, then folded his wings and made the descent very creditably, swooping out over a plowed field to alight.

Another ceremony of the season is the fighting exhibition, which takes place in the air a few feet above the ground. The two males engaging in it begin their advance and attack while on the ground but immediately rise together in a whirl and flutter of gallantry. At first sight these affairs appear to be real fights; I thought they were waged in dead earnest; but more careful observation convinced me that they are ceremonial combats, rather than real fights. There seems never to be an injury, nor even a victory. I have never seen a drop of blood drawn or a feather lost in the encounters. But the tilts are waged with such great persistence that they might well be tests of endurance. On one occasion, larks which were going through their "show fights" near the cabin on the 13th of March kept it up during the 14th and 15th.

The third sort of maneuver is an exciting chase. Two, three, or four birds usually take part in it. They fly in close formation with great swiftness and remarkable skill. It looks like a game of follow the leader, with instant response to every change of the leader's course—a course of rapidly changing, meandering curves.

The ceremonies sometimes begin very early in the season. In the second year (1916), during warm weather which occurred from the 13th to the 27th of February, I several times heard the projectile-like whiz of a diving lark and saw the bird alight. In the same period birds were seen in two's and three's engaged in the swift sinuous chase. The characteristic song was frequently heard. But by the second of March the weather had turned cold and all of these antics had ceased. The song flight was observed again, however, several times before the middle of March.

In general, the song flights are at the height of their popularity about the middle of April, and they have been noted up to the ninth of May. One summer a lark was observed singing the flight-song in the evening of July 19, but the flight was not a very high one, and I did not see whether he finished it with a dive. The first "show fights" were noted March 13 the first year, and March 16 the second year, from which it appears that these affairs begin later than the song flights. On the 17th of the same month four larks were flying together in the rapid chase. The earliest indications of actual nesting were in the second year, when the horned larks began excavating cavities for their nests the first week in April. Cavities were found April 4, 5, 6 and 7, one each day.

The finding of a nest was often by accident; some nests were found by searching. In several instances no bird was in evidence to show ownership. One bird was seen to poise above her nest and alight there to inspect her eggs, thus disclosing the location. Somewhat less than one-fourth of the nests were found by flushing the parent bird or by seeing her fly away.

The habitual subterfuge of the birds when a human intruder is near the nest is to feign disinterest. They will walk about in the short prairie grass, at a considerable distance, pretending to be industriously engaged in picking food from the ground or vegetation. Sometimes both birds engage in this ruse. At a newly found nest, after I had withdrawn from the immediate vicinity, the lark ostensibly searched for food

among the grass tufts and worked her way back and forth in the vicinity of the nest, gradually getting nearer to it. This continued during the entire time that she and I watched each other, which was nearly half an hour. In some cases there is not much of the feigning; often the birds keep hidden from sight.

The nest-building habits, as reflected in the nest itself, its situation, concealment, excavation, structure, lining, orientation, dimensions, and the placement of pieces of sun-baked mud crust, were noted in the previous article. Most interesting of these matters is the habit of placing the flat cakes of mud crust at the entrance side of the nest, and sometimes around the rim. The constancy with which the nests face approximately toward the east is also especially noteworthy.



Fig. 9. Desert Horned Lark on lookout rock near nest number 38; photographed on July 23, 1916.

During the period of nest life, both parents are usually very watchful for signs of danger; but there is a great difference in individuals in regard to shyness. While some do not show themselves, others seem quite fearless after a little acquaintance. At three nests I was unable to catch a glimpse of the birds, though at one of these the parent had evidently slipped away from her warm eggs while I was approaching. A certain pair of larks with young in the down and pin feather stage never visited their nest while I was watching. At another nest, neither of the birds could be found until three days after incubation of the eggs had started.

In pronounced contrast, one bird came into her nest while I sat near it; another stood about ten feet away while I inspected her two eggs and afterward permitted me to pass within four feet of the nest as she sat incubating her full clutch of four eggs (nest 54, described in previous article). Two other incubating birds permitted me to see them sitting in their nests. A nest which was built only a few rods from the cabin seemed to promise sociable neighbors, but the female stood up whenever I came outdoors, and would fly if I approached within thirty or forty feet of her.

A horned lark of most striking temperament was flushed one evening in April of the first year. This bird ran along the ground uttering notes of distress and feigning a disabled left wing which she held out from her side as she ran. There was no nest, only a bare spot scratched in the ground that seemed to mark the beginning of an excavation.

The hardships of rain and cold weather seem to make for larger families. The spring of the third year was the most backward that any settler in the neighborhood could remember, and it was extremely rainy, following a winter of much more than normal snowfall. The small prairie meadows near at hand became ponds of water which persisted for a long time and were frequented by waterfowl. Nature seemed to favor her marsh and water birds, at the same time placing every obstacle in the way of the larks. During that season I found seven sets of four eggs of the Desert Horned Lark and only two sets of three. The other three years, all together, brought to light only seven sets of four, as compared with thirty-one sets of three.

The eggs are usually deposited in the morning; in one instance between 8:00 and 9:00 a.m.; in another before 7:00. In general the eggs all hatch on the same day, though two exceptions were noted. In one of these instances the parent had been sitting in the nest (nest 38) before the clutch was complete. Counting from the date of completion, the hatching date was $9\frac{1}{2}$ days thereafter for the first egg, and eleven days for the last one. The normal period of incubation is ten or eleven days, as noted at other nests.

Apparently the male never assists in the duty of incubation, but both parents take part in feeding the young as soon as the eggs have hatched. The food for the young is evidently of a solid nature from the beginning. A parent was observed carrying a smooth green caterpillar in the afternoon of the day of hatching. Large larval insects are fed to the young birds after they are strong of flight. Parent birds were seen carrying excreta away from the nest when the nestlings were two and three days old.

The earliest aspect of the infant larks was disclosed by an egg hatched in the hand. Taken from a nest one morning late in June, the egg was kept in a warm place. The following day at supper time it plainly was cracked around the middle. The crack widened; and about nine o'clock, while the egg rested in the palm of my hand, the chick managed to wriggle out of the shell. It felt cold to the touch. When it had been warmed between my hands, it soon became more active, and in less than half an hour held up its head and opened its mouth. There were three tiny black spots on its tongue, and a black spot on the inside of the lower mandible at the tip. Soon the little creature began to repeat the lifting of its head at regular intervals of about twenty-four seconds, keeping its mouth open four seconds each time. Later, this rhythm was broken and the intervals became irregular, varying from ten to forty seconds.

At hatching, the young bird showed only a few thin, moist threads about its back and head. In half an hour these had begun to unfurl and separate, some of them having been twisted together by a complete turn or more. Each of the delicate filaments of down, when viewed under a strong magnifying glass, showed numerous finer branches.

Within three-quarters of an hour from hatching, a clear chirp or "whit" could be heard when I held the infant close to my ear. The chick was supplied with warmth through the night in a cotton-lined box in the writer's bunk. Next morning it emitted a speck of excrement although it had not taken any food. When it was ten hours old, nearly all of its natal down was dry, fully three-eighths of an inch long, and very fluffy—a marvelous transformation!

From this stage on, development is surprisingly rapid. The skin, above, is blackish; but at the age of one day the upper surface of the nestling seems covered with the curious long, buffy down. At two days the rapid growth has become especially noticeable. The eyes may begin to open. The long, dead-grass-colored down, though it grows only on certain tracts in decided bunches, appears to cover the whole body of the young bird as it squats in the nest. When three days old the skin has become noticeably blacker and some "pins" are beginning to appear. The nestlings stretch



Fig. 10. Desert Horned Lark nestlings four days old, on May 21, 1915, in nest number 8.

up their open, orange-lined mouths and utter little squeaks. By the next day pin feathers are coming through the skin on all the feather tracts. At the age of six days three youngsters fill the nest; they are covered with a combination of down and pin feathers which exactly matches the dry grass in general color effect. At the age of seven or eight days the nestlings are fairly well feathered and the natal down is confined to the feather tips.

When nine days old, though the young larks are well feathered, the protective coloration remains perfect. All feathers on the upper parts are blackish, broadly tipped with dead-grass color. The feathers of the underparts are white. The tail is about three-eighths of an inch in length. One nestling which I placed outside the nest ran through the grass and squatted six or eight feet away. When ten days old the young have left or are, in most cases, leaving the nest. They are not able to fly but can run very well. It appears that they usually leave in the fore part of the day.

There is evidence that the young sometimes venture out of the nest for a short



Fig. 11. Desert Horned Lark nestlings seven days old, on June 21, 1915, in nest number 20.



Fig. 12. Desert Horned Lark attending young in nest number 8; photographed on May 21, 1915.

distance before they are ready to leave it permanently. There was much excrement in the vicinity of one nest (nest 12) to a distance of a foot or two, while the well feathered young were still in the nest. At a nest in a pastured area I found two young squatting side by side, in true brotherly fashion, a few inches from home. In another instance the brothers had gone in different directions, ten feet and six feet respectively, and doubtless they had no intention of returning.

It is easy to identify the horned lark nestlings, at any stage of their development, by looking into their mouths. The mouth lining is orange, and there are distinct black marks in the mouth and on the tongue. This distinguishes them at once from the nestlings of McCown and Chestnut-collared longspurs, which have plain pink mouths and throat linings. When the young larks have grown up, the orange color fades and the black marks disappear.

The first young are on the wing in the early part of May, my earliest records being May 9, 5 and 11, in the first, second and fourth years, respectively. By the middle of June, or soon thereafter, when the young are fully grown, it is common to see them in family groups, the young following their parents. In flight, the immature birds then show white margins at the sides of their tails, while the tails of the adults show only black at the outer edges.

On their nesting grounds the Desert Horned Larks have to contend with their share of enemies and sources of accident. Among the natural enemies, weasels, skunks and ground squirrels came to my attention, not to mention man, whose poisoned baits set out for ground squirrels apparently kill more birds than spermophiles. One day, by quick action, I intercepted a weasel on his way to a nest to get the last nestling. The birds, of course, are powerless to defend their young against weasels and skunks. It is believed that the abundant ground squirrels often destroy eggs, and possibly sometimes take a nestling; but the adult larks are not afraid of them. It is common to see the larks driving a trespassing squirrel away from their premises. They go after him from the air, in a series of dashes; and quite often the two birds attack together.

The barbed wire fence, new in part of the region when these notes were made, was a source of unexpected danger. Several carcasses of horned larks were found at different times beneath wire fences. One evening at dusk, while walking along a fence, I was startled to hear the top wire suddenly vibrate as though struck a violent blow. Looking quickly, I saw a horned lark fall to the ground. It was instantly killed. A very slight wound on its throat showed the point of impact. On another occasion an immature bird was found hanging by one wing from a barb. The momentum of this bird's flight had turned its body upward around the wire, winding the broken wing once around it.

Storms cause the greatest destruction of nestlings. Eggs and young are kept dry during all ordinary rains. But in some years the destruction of nests by severe and protracted storms is doubtless, over an extensive region, practically total. A continuous rainstorm of three days duration, coming first from the east, then from the north and finally from the northwest, killed all nestlings that were known to me. When the storm was over I found one young lark at the edge of the road, that had survived in good condition. Although too young to fly it had perhaps been out of the nest, and able to run, before the storm began; for it must have found effective shelter somewhere. During the driving rain storms, numerous horned larks and longspurs found refuge in the lee of my cabin, sometimes at the doorstep by the open door.

Excelsior, Minnesota, November 3, 1935.

THREE BROODS OF RED-BACKED JUNCOS IN ONE SEASON

By LYNDON L. HARGRAVE

Since 1931 intensive bird banding has been conducted by the Museum of Northern Arizona at the museum laboratory on the estate of Dr. Harold S. Colton. The mass of data now available contains considerable information on the Red-backed Junco (*Junco caniceps dorsalis*). All observations here recorded were made in the immediate vicinity of the laboratory, where both feeding and banding stations were maintained more or less regularly.

Summer activities of the Red-backed Junco were first noted on March 26, 1935, when two juncos were trapped under conditions that strongly suggested that they were mates. One of these birds wore an old band, number H57672; the other was unbanded. The new bird was given band number H57699. Number "72" was banded at the laboratory on January 30, 1935. It was next trapped at the same station on March 8, but there is no reason to believe that it was not in the vicinity during the interval; the station was not operated regularly. The station was attended more regularly for a while after March 8, and number "72" was taken on the 12th and 13th.

While these birds were at the station on March 26, the banded bird, number "72", was seen to enter a two-compartment trap. The unbanded bird approached the trap, "quivered" before the trapped bird, then entered the empty compartment. The actions of the new bird, number "99", indicated that the bird was a female. The probability that number "72" was a male was verified when it was released, since it flew to a near-by tree and sang. When released, "99" did not sing. In the late afternoon of the 26th, these two juncos were again caught together in the same trap and on release "72" again sang, while "99" did not. Number "72" was recaptured again on April 2 and 3 when it sang when released. Number "99" was recaptured on March 28, and twice on April 4 but it never sang when released. No other juncos were seen during this period. Observations on these two juncos are considered to be conclusive in determining the sex of each individual, "72" a male, "99" a female.

Little is known about "99" prior to her date of banding. She probably was in the vicinity of the station for a few days before March 26 since two juncos were observed on March 24 when one was carrying nesting material. It was not determined whether either of them was banded. It is probable from the foregoing data that the male, "72", a possible winter resident or at least an early spring migrant, was on his breeding ground before the arrival of his mate, "99".

Red-backed Juncos have been known to nest within 100 yards of the banding station, although individuals of this race are not common in the vicinity of the station during the breeding season. During the summer of 1934 a pair of red-backs successfully hatched a brood in a nest in vines under the eaves of the house. Although I was away practically all summer, on several occasions I had an opportunity to observe a Red-backed Junco on the nest. I did not determine whether either of the birds was banded. Only this nest, abnormally situated, has been found here, although in years past, young and adult red-backs have been seen in the vicinity in summer.

First Brood.—Mention of the 1934 nest and brood is made because on June 4, 1935, two banded red-backs brought a juvenile, just out of the nest, to the banding station. Search failed to reveal a new nest in the vines under the eaves of the main house, although these three birds came from the direction of the 1934 nest. The young bird barely could fly and was caught by hand and banded, number H57700.

Using number "700" as bait, number "72" was caught while feeding it. Neither of the old birds seemed concerned about the young junco being in the trap, and both adults would leave it there while hunting food, frequently returning to feed it behind the bars. Number "700" was confined in the trap until its mother was caught. As suspected, she wore band "99", thus establishing previous observations and identifying "72" and "99" as parents of "700". No other juvenal juncos were found, nor was "700" recaptured.

Second Brood.—I was unable to continue observations on these juncos during the remainder of June or in July. On July 26 Dr. Colton saw young juncos fly over the wall into the patio where the 1935 nest was located. Being familiar with my observations in March and in April, Dr. Colton set traps and caught three juvenal red-backs. They were given bands numbered H57701, H57702, and H57703. Using one of these juveniles as bait, he trapped "72", thus establishing this bird as the male parent, and also proving that the Red-backed Junco, under favorable conditions, will raise two broods in one season in the same locality. Numbers "702" and "703" repeated on August 3, but since this date none of the second brood has been recaptured. Since the mother of the second brood was not identified, it is not known if the male red-back had the same mate for both broods.

Third Brood.—After my return to the station in early August no time was devoted to banding until the 21st. On the 20th I heard young juncos near the feeding station and on the 21st I saw two banded adults and one juvenile. The young bird barely could fly and was caught by hand and banded, number H57704. Later in the same day I again saw the banded adults and flushed three juveniles. The juveniles could not be caught by hand, but on the 22nd one, H57705, was caught with "72", thus establishing him as the father of three broods in one season in the same locality.

Further proof that "72" was the father of the August brood is shown by a joint capture of "72" and "704" on September 3. Another juvenile and a banded adult were at the feeding station at the time number "704" was recaptured. Number "72" was in the middle of the annual molt. During the last of August the family frequently visited the station for a few minutes each day. On one occasion both adults were observed carrying millet seed to young fifteen feet above the ground in a pine tree. Number "705" repeated on September 2 with a banded adult, believed not to be "72" because it was wary, and an unbanded juvenile. At all times "99" was wary and reluctant to enter the trap. An unbanded juvenile, believed to be the one just mentioned, also was captured with "99" on September 2. It was given band number H57706.

The family was noted at the feeding station on September 4, when one juvenile and one adult were wary and remained near a small pine about twenty feet from the trap. Although none was recaptured, the birds mixed and travelled together leaving little doubt that all were of one family. Later in the day an unbanded juvenile, believed to be the last of the third brood, was taken and was given band number H57707. Although not taken with any young of the third brood with which "72" was taken, the presence of "99" with juveniles travelling with "72" is good reason to believe that "72" and "99" were mates during the third nesting period and that very likely they were mates during the entire breeding period.

Joint recaptures of these young birds further strengthen the belief that all were of one family. At no time between June 4 and September 10 were unbanded adults seen, nor were either juveniles or immatures seen in a stage of molt exceeding that of the banded members of the third brood. On September 10, "705" repeated, and there were several others present. On this date an unbanded adult and an immature

in an advanced stage of molt were seen also. This was the first unbanded adult seen since spring and the occasion is the first evidence noted of an encroachment of territory. Both unbanded birds were captured and were given numbers H57708 and H57709, respectively. On the 11th other unbanded Red-backed Juncos were noted, indicating that the fall movement was under way.

The family remained together for several days longer and at one time or another several of its members were caught together. The parents may have left the brood at the same time, since "99" was last taken on September 3 while "72" was last captured with his family on the same date. Number "72", however, was again captured on November 8, 1935, after an absence of more than two months, during which time nine trapping stations were maintained regularly and trapping was more intensive than at any time previous. The area studied covered nearly 400 acres. Had "72" been in the vicinity he almost certainly would have been captured, since he never had shown fear of the traps. Number "704" repeated regularly until the 16th; "705" until the 15th; "706", while in the trap on the 14th, was killed by a Sharp-shinned Hawk, and "707" was last trapped on the 17th. When the brood moved out, migrating Red-backed Juncos were abundant.

Summary.—The summer's observations on breeding Red-backed Juncos at Coyote Range, Flagstaff, Arizona, have shown (1) that the male probably wintered within his prospective summer territory inasmuch as he returned to the locality on November 8, 1935, where he was banded on January 30 of the same year and where he was recaptured in early March; (2) that the female probably appeared on her breeding ground after the male had established himself; (3) that nesting activities were under way by March 24; (4) that one brood was hatched near the first of June, another in late July, and the last in late August; (5) that the male was father to three broods and the female was mother to the first and third and probably the second broods; (6) that shortly after leaving the nest the young of all but the last brood moved out of the nesting territory; (7) that the third and last brood remained within the nesting territory until the postjuvenile molt was nearly completed; (8) that the parents apparently left the nesting territory together and ahead of their offspring of their third brood; (9) that, after the summer adults had left, the young of the third brood remained and mixed with others of their race; and (10) that the members of the third brood apparently left the nesting territory together after the fall migration was well under way.

Museum of Northern Arizona, Flagstaff, Arizona, January 1, 1936.

NESTING OF THE BONAPARTE GULL IN BRITISH COLUMBIA

WITH ONE ILLUSTRATION

By J. A. MUNRO

The Bonaparte Gull (*Larus philadelphia*) has been definitely recorded as nesting at Atlin Lake in extreme northwestern British Columbia (Brooks and Swarth, Pac. Coast Avifauna No. 17, 1925, p. 28). These authors refer also to reported nesting colonies at Fort St. James and at Moorehead Lake in the Cariboo region, the latter reference being based on evidence submitted by local residents and observations, by the senior author, of small flocks of adult Bonaparte Gulls flying directly toward this lake after fishing in lakes some twelve miles to the southwest. This was in July, 1901. Apparently these are the only references in literature to the species nesting in British Columbia. Consequently the discovery on June 24, 1935, of a small nesting colony at Bridge Lake in the Cariboo region is considered of sufficient interest to place on record.

The location and topography of Bridge Lake is set forth in an article describing a Herring Gull colony at that place. (See Munro, Condor, 37, 1935, pp. 214-215.) It was following a visit to this Herring Gull colony, and while returning to shore, that the presence of Bonaparte Gulls was detected through seeing a single individual of this species fly toward a small wooded island situated about half way between the gull rock and the mainland. While I was proceeding toward this island and was distant from it about 150 yards, two adult Bonaparte Gulls flew toward the boat, and after circling over, and swooping down several times, alighted on the water alongside. These were photographed at a distance of twelve feet. The two birds followed the boat with short flights, descending on the water between times, and became increasingly excited as the wooded shores were neared. The reason became apparent when two downy young were discovered swimming in and out among the flooded brush along the shore. These were captured without difficulty and proved to be approximately a week old, with sheathed primaries showing about three-quarters of an inch beyond the down.

Meanwhile the two adults, sometimes accompanied by a third, either circled overhead or stood on a dead branch of a birch tree which extended over the water from a green background of alder and willow foliage. The island is approximately an acre in extent, thickly wooded with alder, birch, willow, dogwood, and, rising above them, tall, slim Englemann spruce and Douglas fir. The lake level being abnormally high, only two to five feet of the steep, rocky shore showed above water and this shore line was overhung by an all but impenetrable tangle of deciduous growth, as shown in accompanying photograph (fig. 13). Here and there were prostrate conifers still imbedded at the roots while their crowns rested in the lake.

A careful survey of all the trees along the shore revealed one nest, on a stout branch close to the trunk and twenty feet above the base of a sixty foot spruce growing at the water's edge. This proved to be an old nest and in the possession of a pair of Tree Swallows. Four eggs of this latter species occupied a slight depression lined with gull feathers at one side of the nest.

In the interior of the island fallen trees were piled everywhere in great confusion, some on the ground, others supported at various angles by the standing timber. The interstices were grown up with thickets of wild gooseberry and other shrubs. Near the island's center a small space clear of standing timber permitted a clear view of the surrounding trees, and with this vantage point as a base a survey of the island

was conducted. Here two Bonaparte Gulls, standing on separate trees and calling continuously with the characteristic twanging note, attracted others which kept passing back and forth, sometimes to alight momentarily in one or another of the near-by trees. At one time six individuals were in sight and this number apparently represented the entire colony.



Fig. 13. Adult Bonaparte Gulls on a dead limb of a tree at Bridge Lake, Cariboo region, British Columbia; June 24, 1935.

The conifers which were thought to be the most probable sites for nests were scrutinized carefully, but the gulls showed no increase of excitement upon my approaching any particular tree. Most of the conifers were in a dying condition, with accumulations of broken twigs both on the dead branches and among the live foliage. Many such deposits resembled closely the old nest previously described. Thus the finding of nests, if such were present, presented a problem which I was unable to solve in the time available.

Moreover, the season being so far advanced, it seemed unlikely that eggs or young would be still in the nest, and the possibility of the young having been taken by Herring Gulls nesting on a near-by island was considered. This was suggested after seeing eight Herring Gulls attacked and driven off by the Bonaparte Gulls.

There is reason to believe that Bonaparte Gulls nest also on Montana Lake, a small lake in thickly wooded country only a short distance from Bridge Lake. Reports by local residents that a pair of small black-headed gulls with young were seen on Montana Lake during several successive summers are believed to be reliable.

Okanagan Landing, B. C., September 25, 1935.

VIABILITY OF WEED SEEDS AFTER INGESTION
BY CALIFORNIA LINNETS

By ELIZABETH S. ROESSLER

There has long been question as to whether the birds of the seed-eating family Fringillidae destroy or disseminate weed seeds. Kerner (The Natural History of Plants, London, Blackie & Son, Ltd., 1895, pp. 862-866) fed fruits and seeds of 250 species of plants to various kinds of birds. The feces were examined and laid on a bed of earth with the same fruits and seeds as a control in an adjoining bed. The first group of birds, which includes all the Fringillidae in his experiments (Bull Finch, European Goldfinch, Serin Finch), ground up the fruit and seed in their gizzards and no seeds germinated. In the second group, Ravens and Jackdaws, hard coated seeds passed through the digestive tract uninjured. In the third group, European Blackbird, Song-thrush, Rock-thrush and European Robin, 75 to 88 per cent of the seeds that went through the intestine germinated.

Judd (U. S. Dept. Agric., Biol. Survey Bull., 15, 1901, pp. 49-50) examined the droppings of English Sparrows that had been fed weed seeds and found no whole seeds; he concluded that the sparrows destroyed the seeds. Beal (U. S. Dept. Agric., Biol. Survey. Bull. 30, 34, 1907, 1910) found that over 86 per cent of the food of California Linnets is composed of weed seeds; he remarks that each linnet destroys several hundred seeds daily and therefore renders a valuable service to agriculture. Beal has also shown that the Wren-tit, the California Thrasher and other local species spread the seeds of poison oak.

Collinge (The Food of some British Wild Birds: a Study of Economic Ornithology, York, 1924-27) admits "that birds annually destroy a large quantity of the seeds of various weeds." But he found when he planted the droppings from House (English) Sparrows, Greenfinches, and Bullfinches in sterile soil that a good many weeds grew. He makes no statement as to the number of weed seeds eaten and hence draws no conclusions as to the percent of seeds destroyed or disseminated. He concludes that "in dry years such birds as the Rook, the Starling, the House-Sparrow (and probably many other species) take in a smaller quantity of grit and soil than in wet years, in consequence of which a larger percentage of weed seeds pass through the intestinal canal in an uninjured condition."

In the present experiments, California Linnets (*Carpodacus mexicanus frontalis*) were fed carefully counted numbers of weed seeds. The droppings were planted in boxes containing steam-sterilized soil and kept under greenhouse conditions in order to determine what per cent of the weed seeds eaten were viable after passage through the digestive tracts of the birds. Two pairs of linnets were kept in an outdoor cage three by three by six feet in size, that allowed some room for exercise. Millet, canary, rape and sunflower seeds, fresh fruit, sand, and gravel were always available to the birds, even during the experiments.

For each experiment the cage was thoroughly cleaned and the floor was completely covered with a sheet of paper. The weed seeds and other foods were placed in small dishes inside of a pan a foot square with sides four inches high that practically prevented scattering of the seed. Eight hours after the last weed seeds were eaten, the paper, with all the droppings that had been passed, was removed from the cage and the droppings placed on sterile soil in one half of a divided "flat." Some of the droppings were broken up as they were transferred to the soil; others were kept intact.

Just enough sterile soil was sprinkled over the droppings to keep them from washing. The other half of each flat was used as a control by planting 100 seeds of each species of seed used in the experiment. The flats were kept in a cold frame and watered daily, unless otherwise noted; the number of germinations was observed daily.

Table 1 presents the results of these experiments. Time in days means length of time it took the seeds to germinate; where there has been no germination it means the length of the period over which droppings and control seeds have been under observation.

TABLE 1
GERMINATION OF WEED SEEDS IN STERILE SOIL AFTER PASSAGE THROUGH LINNETS

Species of weed seed used	Number of seeds fed to birds	Germination from droppings		Germination of control seeds	
		Number	Time (days)	Per cent	Time (days)
Bermuda grass (<i>Cynodon dactylon</i>)	375	1	10	90	14
Blow-wives (<i>Achyranthes mollis</i>)	500	0	70	0	70
Canary seed (<i>Phalaris canariensis</i>)	1000	0	31	54	7
Dandelion (<i>Taraxacum officinale</i>)	500	0	85	54	13
Flax (<i>Linum usitatissimum</i>)	2000	0	62	58	7
German millet (<i>Panicum germanicum</i>)	1000	0	31	73	7
German millet (<i>Panicum germanicum</i>)	2000	0	85	73	7
Lettuce (<i>Lactuca</i> sp.)	2000	0	62	30	8
Rape (<i>Brassica napus</i>)	1000	0	31	80	7
Red millet (<i>Panicum miliaceum</i>)	1000	0	70	60	4
Thistle (<i>Guizotia abyssinica</i>)	2000	0	62	40	7
Wild mustard (<i>Brassica arvensis</i>)	200	0	31	51	13
Wild mustard (<i>Brassica arvensis</i>)	500	0	85	60	12
Yellow burweed (<i>Amsinckia intermedia</i>)	500	0	70	0	70

Since long contact with the droppings might possibly destroy the viability of fragments of included seed, in the next set of experiments smaller sheets of paper were put under the perches, in addition to the sheet of paper over the whole floor, and the droppings then collected at hourly intervals and planted and watered immediately, while they were still moist. At the end of the experiment the droppings from the large sheet of paper were also planted. The results of these tests appear in table 2. All germination from droppings were from those evacuated seven hours after the presentation of the weed seeds with the exception of the dandelion seed in which the interval was six hours.

TABLE 2
GERMINATION OF WEED SEEDS FROM DROPPINGS COLLECTED HOURLY

Species of weed seed used	Number of seeds fed to birds	Germination from droppings		Germination of control seeds	
		Number	Time (days)	Per cent	Time (days)
Alfalfa (<i>Erodium cicutarium</i>)	700	0	190	74	20
Bermuda grass (<i>Cynodon dactylon</i>)	2000	1	180	26	150
Chickweed (<i>Stellaria media</i>)	600	1	160	80	180
Dandelion (<i>Taraxacum officinale</i>)	900	1	165	32	180
Flax (<i>Linum usitatissimum</i>)	2000	0	190	60	8
Lettuce (<i>Lactuca</i> sp.)	2000	0	190	34	8
Shepherds Purse (<i>Capsella bursa-pastoris</i>)	2000	1	160	6	180
Thistle (<i>Guizotia abyssinica</i>)	2000	0	190	64	8
Wild mustard (<i>Brassica arvensis</i>)	2000	0	190	74	20

An effort was made to determine whether lack of a supply of grit or whether availability of fruit had any bearing on the digestion of weed seeds. In one experiment both grit and fruit were withheld for 53 hours previous to and during the experiment. In another, grit was similarly withheld but fruit was generously supplied in the form of ripe apples and strawberries. It is generally understood that birds retain grit, sometimes for long periods of time, when no additional supply is available. The withholding

of fresh supplies for two days would, therefore, probably reflect but little difference in effect, if any, by this procedure, upon the passage of viable seeds.

As weed seeds in sufficient quantities were difficult to obtain, much of the seed used was gathered by the writer during the experiments. Such fresh seed had not passed through its dormant period and that of some species would not germinate for many months. While this is typical of field conditions and might be advantageous in obtaining a true picture of the results of weed seed feeding by linnets, it imposed certain restrictions upon the experiments. It was necessary to do each experiment in duplicate; one set of flats was kept damp, the others were allowed to dry out during the summer as does the soil in the field. Watering of the latter was resumed with the first fall rain, on October 1.

In Table 3 results of both sets of experiments are given. Germinations from droppings were from those evacuated four hours after the presentation of the seeds.

TABLE 3
GERMINATION OF WEED SEEDS FROM GRIT AND FRUIT EXPERIMENTS

Species of weed used	Number of seeds fed to birds	No grit, no fruit Flats allowed to dry			No grit, no fruit Flats kept wet Droppings planted hourly			No grit, much fruit Flats allowed to dry			No grit, much fruit Flats kept wet Droppings planted hourly		
		Droppings	Controls	Number	Time	Number	Time	Number	Time	Per cent	Number	Time	Per cent
Alfileria (<i>Erodium cicutarium</i>)	250	0	160	0	160	0	165	2	92	0	150	0	140
Blow-wives (<i>Achyranthes mollis</i>)	250	0	160	0	160	0	165	0	165	0	150	0	140
Chickweed (<i>Stellaria media</i>)	250	0	160	0	160	1	155	14	165	0	150	0	140
Dandelion (<i>Taraxacum officinale</i>)	250	0	160	16	18	0	165	0	165	0	150	0	140
Flax (<i>Linum usitatissimum</i>)	250	0	160	40	6	0	165	62	10	0	150	40	6
Lettuce (<i>Lactuca sp.</i>)	250	0	160	20	6	1	4	8	4	0	150	20	6
Thistle (<i>Guizotia abyssinica</i>)	250	0	160	30	6	0	165	38	10	0	150	30	6
Wild mustard (<i>Brassica arvensis</i>)	250	0	160	66	18	0	165	64	10	0	150	66	18
Yellow burweed (<i>Amsinckia intermedia</i>)	250	0	160	0	160	0	165	12	140	0	150	0	140

A few droppings (15) from wild linnets were planted; these were collected by placing bread crumbs and strawberries on a large sheet of paper on the ground. Some droppings (8) of wild White-crowned Sparrows (*Zonotrichia leucophrys gambelii*) were similarly collected and planted in sterile soil. One box was kept damp and the other allowed to dry out during the summer; the latter was watered again, beginning October 1. The material of each dropping was planted separately. The flats were inspected daily. No germinations resulted in a period of 190 days.

Observations on the feeding habits of the linnets showed that each seed that is to be eaten is very carefully hulled. Seeds with hard shells, such as those of morning glory and bur clover, were ignored as were minute seeds like those of poppy and mayweed. From a dish of mixed seeds of various sizes, such as chickweed, hemp, lettuce, pigweed, and thistle, each linnet ate approximately 1000 to 1200 seeds per day.

The seeds eaten, in order of preference, were:

- Thistle (*Guizotia abyssinica*)
- Hemp (*Cannabis sativa*)
- Flax (*Linum usitatissimum*)
- Rough pigweed (*Amaranthus retroflexus*)
- Alfileria (*Erodium cicutarium*)

- Blow-wives (*Achyraena mollis*)
- Yellow burweed (*Amsinckia intermedia*)
- Wild mustard (*Brassica arvensis*)
- Canary seed (*Phalaris canariensis*)
- Rape (*Brassica napus*)
- Dandelion (*Taraxacum officinale*)
- Common sow thistle (*Sonchus oleraceus*)
- Curled dock (*Rumex crispus*)
- Lettuce (*Lactuca* sp.)
- Chickweed (*Stellaria media*)
- Sunflower (*Helianthus annuus*)
- German millet (*Panicum germanicum*)
- Hog millet (*Panicum miliaceum*)
- Bermuda grass (*Synodon dactylon*)
- Shepherd's purse (*Capsella bursa-pastoris*)

Other foods eaten were: strawberries, apples, cracker crumbs, yolk of hard boiled egg and ground red pepper.

Foods offered but not eaten included seeds of the following species:

- Morning glory (*Convolvulus arvensis*)
- Wild oats (*Avena fatua*)
- Pine nuts (shelled or unshelled)
- Bur clover (*Medicago hispida*)
- Sour clover (*Medicago* sp.)
- Cheat or chess (*Bromus secalinus*)
- Wild barley (*Hordeum jubatum*)
- Poppy (*Papaver somniferum*)
- Mayweed (*Anthemis cotula*)

In summary, of 40,025 experimental seeds eaten by the linnets, only 7 germinated. The single seed of shepherd's purse that germinated after going through a bird was one of 2000; however, since the control germination for this seed showed only 6 per cent viability in that experiment, it is safer to conclude that one of 120 viable shepherd's purse seeds ingested by linnets might germinate under appropriate conditions. The ratios of the other germinations as between droppings and controls are: Bermuda grass, 2:858; chickweed, 2:515; dandelion, 1:288; lettuce, 1:20.

It is interesting to note that in six of these seven cases the droppings were planted while still moist and watered immediately so that any destructive action due to long contact with the dropping was eliminated. In the seventh case the dropping may have been fresh when planted. In all these seven cases the seeds involved are small and presumably more difficult for the bird to hull than are larger seeds. It is possible that all seven seeds were accidentally swallowed whole by the birds and, because of their protective hulls, passed uninjured through their digestive tracts.

Since linnets live almost exclusively on seeds and must therefore digest most of them to live, and since even under favorable conditions there are very few germinations from the remains of seeds in the droppings, it seems safe to conclude that linnets do not spread weed seeds to any appreciable extent, if at all. On the contrary, each linnet probably destroys about 1000 seeds daily.

The writer wishes to express appreciation to Dr. T. I. Storer for his constant interest and help in this study.

Davis, California, November 29, 1935.

TAXONOMIC COMMENTS ON RED-TAILED HAWKS

WITH MAP

By P. A. TAVERNER

In view of the treatment of the Red-tailed Hawks (*Buteo borealis*) in Peters' "Birds of the World" (vol. 1, 1931, pp. 231-232), it seems desirable to review the collection upon which a previous study (Taverner, Museum Bull. 48, Victoria Memorial Museum, 1927) was founded. This material consists of 121 specimens taken across the continent and critical notes made upon nearly as many more in other collections. Many of the birds were collected from the nest, and many of these were accompanied by young in advanced plumage. For the primary conclusions herein reached only breeding birds or those whose residential status can be confidently assumed have been used. The evidence is therefore more dependable than if deduced from migrant or wintering material of uncertain geographic origin. In this discussion the interest is taxonomic rather than nomenclatural and I disregard the specific name *jamaicensis* in favor of the more familiar *borealis*.

There are two recognizably distinct plumages in the species: the juvenile (yearling) and the adult. There are no distinctive sexual differences except those of size. The plumage acquired in the nest is held until the following summer, when it is molted for one which is retained throughout life without material alteration or progressive development. This is shown by some fifteen or more yearlings that are going directly into fully developed adult plumage and adults undergoing their annual mid-summer molt without change in color or pattern. In no case is there perceptible change, except as above, aside from that due to fading and wear. There is no recognizable second year plumage as has been postulated by some students of the species.

Juveniles and yearlings, besides their distinctive first-year plumage, have narrower, more sharply pointed tail feathers than adults, in which latter, the tail tips unless reduced by wear are broadly rounded or nearly square. Young birds in, or lately from, the nest often show the white areas distinctly buffy, but this buffiness is largely evanescent and often quickly fades to pure white before fall. Except for melanistic tendencies in certain strains, the tail coloration is the best indicator of racial affinity. The barring of the thighs (flags) is a less reliable diagnostic character than has been generally supposed. A common tradition that juveniles overmeasure adults is not supported by the evidence; on the average, the contrary is the case.

The breeding adults, arranged geographically, fall into four generalized color groups, highly variable in detail but practically constant in essential characters.

1. An eastern type of moderate depth of coloration, with a plain red tail usually with black subterminal bar. This group is the most variable in size, but is more constant in color than any of the others. Color variants occur but are the exception rather than the rule. This is *Buteo borealis* (Gmelin).

2. A far western type, usually heavily colored, with a black phase and many intermediates between the extremes. Many may be erythro-melanistic—generally black with areas of dull red, especially on the breast (II, 8). References so given refer to color plates and figures in my study of *Buteo borealis* cited previously. The most constant character is a red tail crossed by several more or less sharply defined black bars. Within wide limits of variation it is as constant through a far western range as *borealis* is through an eastern one. This is *Buteo borealis calurus* Cassin.

3. A mid-western type with greatly reduced coloration and tail largely white. Its distinction is its general whiteness. It is as if *borealis* were bleached to partial whiteness, with only the heaviest color masses remaining. The same general character is exhibited by both juvenile and adult. Typical examples are illustrated: the adult in Roberts' "Birds of Minnesota", plate 15, the juvenile (I, 1).

This whiteness is highly variable in individuals in both degree and amount. This type has been known as *Buteo borealis kriderii* Hoopes.

4. A northwestern type, possibly, but not certainly, with two phases. It averages slightly larger than the others and the blacks are unusually deep and rich. The tail is figured with specklings, marblings or cloudings of black, gray, red and white in any combination or proportion, with a tendency to longitudinal streaks instead of transverse bars. The unique tail is the only definitely recognizable distinctive character. This bird we have commonly called *Buteo borealis harlani* (Audubon) as per British Museum Catalogue of Birds (vol. 1, p. 191). (Typical examples of tail, I, 16-21.)

With these definitions we find the following breeding distributions.

In eastern Canada, including Ontario, comparatively pure *borealis* (I, 1-3).

In southern British Columbia, practically pure *calurus* (I, 5, 6; II, 8; III, 1).

Besides the above comparatively pure breeding strains we have the following mixed associations.

In southern Manitoba, *borealis*, *calurus* and *kriderii* (II, 6).

In southern Alberta, *borealis*, *calurus*, *kriderii* and *harlani* (II, 2-5; III, 6, 7).

Along the British Columbia-Yukon boundary and in near-by Alaska, *harlani*, *calurus* and *kriderii* (III, 2, 3; I, 1, 12, 23).

Not only are these in close proximity, but in at least one case actual mixed breeding, *calurus* x *harlani* has been collected from the nest (III, 2-5).

In these mixed populations occur many birds of hybrid character. Among the specimens it is easy to pick out specimens which appear to be results of the following matings:

borealis x *kriderii*

borealis x *calurus*

borealis x *harlani*, see Ridgway, Auk, 7, 1890, p. 205.

calurus x *kriderii* (II, 3)

calurus x *harlani* (III, 4, 5)

harlani x *kriderii* (III, 3) also "Buteo cooperi"

In some cases the characteristics of three and even four forms can be recognized in a single individual. There are many peculiar color combinations and the young do not always follow the character details of their parents. For instance, from southern Manitoba and southern Alberta we have parent birds practically pure *borealis* in body plumage but with the white tails of *kriderii* crossed by the bars of *calurus*. The young of these reverse the characters and are *borealis* (or *calurus*) in tails and *kriderii* in body (II, 3, 4, 6, 7). Another female of general *calurus* or *borealis* cast, from southern Alberta, shows *kriderii* strain in a white tail which is strongly streaked with longitudinal markings of *harlani*. Its young shows the *kriderii* influence in crown and face (III, 6, 7). (See fig. 14.)

Similar examples of the erratic inheritance of characters in generations of mixed strains is exhibited in a family of flickers (*Colaptes*) in this museum. The two parents are obviously of mixed blood, one predominantly *cafer*, the other predominantly *auratus*. Of the five nest-mates of this union three are distinctly hybrid of different types, while the other two are, by all external appearance, pure *auratus*. These and the hawks seem to show "relative independence of characters after crossing due to the existence of separate Mendelian genes and their capacity for recombination" (Julian Huxley, Yale Review, 24, 1935, p. 678.). It is practically certain that none of the birds in these mixed populations can be regarded as of pure descent from any one race. The strains are mixed and mongrelized. Even the most typical-appearing individual undoubtedly has recessive genes that may "throw" other racial characters in subsequent generations.

Distributional evidence reveals that only *borealis* and *calurus* have ranges apart

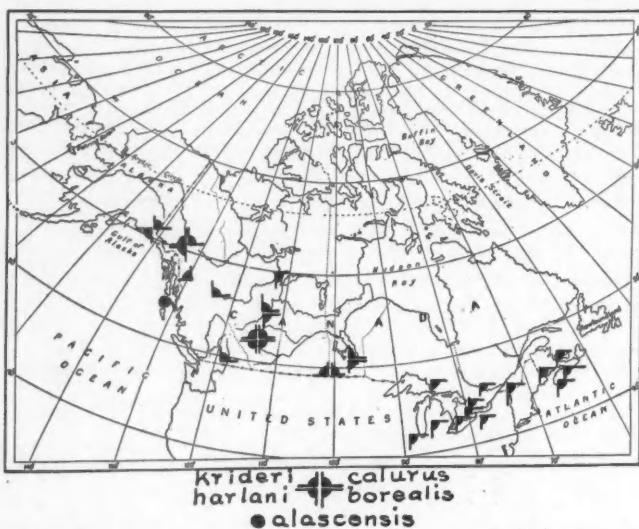


Fig. 14. Map of northern North America showing localities of breeding records for the kinds of Red-tailed Hawks.

from other strains of the species. They are well-marked, fairly consistent and geographically independent, and they can be regarded as valid races or subspecies. *Kriderii* and *harlani* occur only in association with each other or with *borealis* or *calurus*. They therefore cannot be subspecies in the current use of the term. They must be called either dichromatisms or full species.

Kriderii in effect is but a bleached *borealis*. It presents only a dilution, diminution or suppression of color and hence introduces no new factor into the species. It is unstable, no two birds being alike. Completely typical birds are rare and the majority show their *kriderii* natures in different details and in varying degree. It is quite possible to postulate *kriderii* as a distinct species far gone in mongrelization with *borealis* and allied strains. But in view of the fact that dichromatism is a common tradition in the genus *Buteo*, and because there is no new feature introduced and the distinctions are quantitative rather than qualitative, it seems the conservative course to consider the case one of dichromatism.

Harlani presents a different problem. Birds that can be regarded as typical are not uncommon and the characters seem to have some degree of fixity. The increase in darkness of color and the slight average superiority in size may be mere varietal characters, but more important is the tail; and this is unique in the genus. The peculiar mottling of the tail and its tendency towards longitudinal instead of transverse marking is an entirely new color pattern; and it is qualitative in character instead of quantitative. On these considerations it seems logical to regard this as a full species which hybridizes freely with *borealis* in all its forms. That it does hybridize with *calurus* is unmistakably demonstrated by a family from the Mount Logan region, Alaska (III, 2-5). That it crosses with *kriderii* is shown by the southern Alberta bird in which *harlani* markings are plainly superimposed on an

otherwise kriderine bird (III, 6). Both *kriderii* and *calurus* can be demonstrated to occur in both these regions.

Whether pure *harlani*, if such a thing exists today, has a light phase or not is uncertain. There are many unmistakably *harlani* birds with extensive white below and with whitened tails, but whether these are normal dichromatisms of the species or the results of matings with *kriderii* individuals, there is no way of deciding. Until evidence is produced to the contrary, it seems most probable that the original stock of *harlani* was all black, with tail marbled with black and gray (I, 20), and that variants from this type denote other blood strains—intermixtures of red from *calurus* or *borealis* (I, 18, 19, 21) and of white from *kriderii* (I, 17; III, 3). Whether this species arose as a mutation from an existing form of *Buteo borealis* or evolved from a coördinate branch of the genus is a question of origin, not of present fact, and hence outside this inquiry.

As said before, *borealis*, except for size which is surprisingly variable, is the most constant form of the species. But even in the apparent centers of its range occasional *calurus*-like birds appear. Whether these are spontaneous variants, the results of occasional previous *calurus* matings, or stray wanderers from the west, is uncertain. Until eastern breeding of such individuals is demonstrated, it seems prudent to call them of the latter category. The birds of the southern prairies of Canada are predominantly *borealis*, more uniform toward the north and more like *calurus* westward toward the mountains.

Calurus is astonishingly variable in color, ranging from solidly black, except tail, like the type specimen of the race (III, 1) and erythrusm (II, 8) to birds that might pass as richly colored *borealis*, with every intermediate degree. Even the multiple barring of the tail may be absent in specimens that are otherwise well-characterized *calurus*. If birds occur that are *borealis* in body and *calurus* in tail, and others, conversely, with *calurus* body and *borealis* tail, it seems that the reshuffling of genes can produce individuals of pure *calurus* descent but inseparable by us from typical *borealis*. There are breeding specimens from undoubtedly *calurus* communities that would pass anywhere in the east as typical *borealis*. These are converse cases to the *calurus* intrusives in *borealis* territory, mentioned before.

The occurrence of occasional individuals of one race within the established range of another is not peculiar to Red-tailed Hawks, but occurs in many other species. How to designate them, whether to name them by their apparent characters or by their probable genetic descent, is a matter of differing opinion. But with the general constancy of *borealis* in the east and *calurus* in the west, the occurrence of such occasional exceptions to the rule is not sufficient to invalidate either form as a subspecies. The characters are well marked and probably over ninety per cent of the specimens from extensive areas can be unhesitatingly identified.

A form, *Buteo borealis alasensis* Grinnell, has been recognized by Peters and by some other authors, but it is not in the A.O.U. Check-list. The type locality is Glacier Bay, Alaska, and it is presumed to be a coastal form ranging south to the Queen Charlotte Islands. From this latter locality we have eight juveniles of the year and one adult male in erythro-melanistic plumage (II, 8). From the date and from the thickened skin on the throat, the latter can reasonably be assumed to be a local breeder.

(These large hawks in brooding commonly rest their heads upon the rough nest edge. This wears away the feathers and causes a rugose condition of the throat. In fresh birds the corrugations are often pronounced and yellow-tipped like the

cere. In dried specimens the effect is less apparent, but the thickening of the skin is usually in evidence.)

As far as color goes there is nothing distinctive from *calurus* in any of these Queen Charlotte birds. However, all are consistently and distinctly small, the largest female (wing 368 mm.) being smaller than the smallest male in the transcontinental series, except some of the eastern *borealis* variants. They can be described as small *calurus* and as such upon present evidence can be given rather guarded acceptance as a subspecies of *Buteo borealis*.

A subspecies that has lately been described is *Buteo jamaicensis fuertesi* Sutton and Van Tyne (Occas. Papers Mus. Zool., No. 321, Univ. Mich., 1935, p. 1) [=*Buteo borealis fuertesi*] from Texas. The privilege of examining the type series of this race has been available. It strikes one as being *borealis* slightly pale in color and nearly immaculate below and on the flanks. It is quite within the possible range of hybridism between *borealis* and *kriderii*, and similar birds can be expected to occur occasionally wherever these two strains are in contact. However, the constancy of this particular assemblage of characters in some twelve specimens makes one pause before summarily dismissing the race, especially as we have at this time no evidence of *kriderii* breeding in the neighborhood. This series includes breeding birds, so the question of migration does not cloud the issue. But here again we find cross-breeding. One of these birds was mated with a typical light-phased *calurus*, and another shows distinct *calurus* tendency. A survey of the breeding birds from the surrounding territory is desirable to establish that this is not more than a recurrent type of *kriderii* hybrid. In the meantime it may be well to accept it as a recognizable race.

One other bird has come under the purview of the writer, *Buteo cooperi* Cassin. The type and only specimen has aroused considerable speculation. In the light of the above experience there can be no hesitation in regarding it as a hybrid between *kriderii* and *harlani*. In general, it is of *borealis* type, rather pale, with tail largely white and with characteristic *harlani* markings. Its tail is approximately like the bird figured in Plate I, figure 18 (*op. cit.*) but with more white toward the base and with markings about half as extensive.

A key to the adults treated here may be constructed as follows:

Tail plain red, usually with black subterminal bar. Body moderately colored, below predominantly white to rich cream.	
Dark markings on flank and abdomen pronounced.	<i>borealis</i>
Few or no dark markings on flank and abdomen.	<i>fuertesi</i>
Tail red, usually crossed by several dark bars more or less sharply indicated (rarely as above). Body more or less heavily colored, in extreme cases even to solidly black below and above.	
Wing over 368 mm.	<i>calurus</i>
Wing 368 mm. or under	<i>alascensis</i>
Tail largely white. Body with much white below on flanks, face, crown and intermixed in scapulars. Some of these details may be lacking.	<i>kriderii</i>
Tail curiously speckled, marbled or clouded, with tendency toward longitudinal streaks. Body usually more or less completely rich chocolate black.	<i>harlani</i>
Combinations of above characters show hybridism or intergradations between forms.	

This key is a guide to the identification of adults of the species and races, but identification of juveniles is more difficult and probably in some cases impossible. Juvenile *calurus* and *alascensis* are separable (?) by size. Juvenile *calurus* in light phase is so much like corresponding plumage of *borealis* that no definite line can be drawn between them. *Calurus* usually shows more black below, and the ground color of the tail may have more red (I, 7). But these details are not constant; true *borealis* may

show as much black as many *calurus* and the tail may be distinctly rusty. Juvenile *calurus* in complete or partial black phase can of course readily be told from *borealis* but not from *harlani*, which latter may also be more or less solidly black.

Juvenile *harlani*, judging from young birds of known parentage (undoubtedly all of more or less mixed descent), average considerably richer in the blacks than the few equally authenticated similar birds available that we have good reason to ascribe to *calurus*. There is, however, no evidence to justify the conclusion that *calurus* cannot be as richly black as *harlani*. Both are variable in this particular and undoubtedly show considerable overlapping. In the series before me are a number of black juveniles. They can be separated into two groups on various arbitrary criteria, but there is no certainty that the division accords with genetic relationship.

Juvenile *kriderii*, in the less diluted strains, is distinctly recognizable. The ground color of the tail is light, even to almost pure white against which the cross bars common to all juveniles of these species stand in strong contrast. The body below has the black markings much reduced or absent. The crown and face may be largely white, and there may be extensive intrusions of white in the scapulars. Strongly marked birds, in which some or all these characters obtain in definite degree, are easily recognized but are not common. The type specimen (II, 1) is the extreme in this direction. With individual variation, or the intrusion of other blood strains, these characters are weaker and in many cases their presence or absence requires some experience with the species for evaluation.

Fuertesi, as far as seen in the type series, might well be taken for a *borealis* x *kriderii* hybrid, with the *kriderii* influence restricted to the underparts and the flanks. At present, geographic considerations must be important in its identification.

The systematic results of this study divide the birds treated, as follows:

Buteo borealis (Gmelin)

Buteo borealis borealis (Gmelin), with white phase [*kriderii*].

Buteo borealis calurus Cassin, with black phase.

Buteo borealis alascensis Grinnell (?).

Buteo borealis fuertesi Sutton and Van Tyne.

Buteo harlani (Audubon)

Acknowledgments.—The writer has had the privilege of consulting collections in the U. S. National Museum, Philadelphia Academy of Natural Sciences, Museum of Vertebrate Zoology, Museum of Comparative Zoology, Museum of the University of Michigan, Provincial Museum of British Columbia, and Royal Ontario Museum, as well as the private collections of Jonathan Dwight, Allan Brooks, J. H. Fleming and others. To all of these I extend my thanks for their courtesies.

National Museum of Canada, Ottawa, Canada, December 19, 1935.

EATING HABITS OF FALCONS WITH SPECIAL REFERENCE TO PELLET ANALYSIS

By RICHARD M. BOND

The following resumé is based on observations on Duck Hawks (*Falco peregrinus anatum*) at 21 eyries in California, Washington and New England, and on 5 young, from various localities, which I raised and partly or completely trained for falconry; on about a dozen eyries of Prairie Falcons (*Falco mexicanus*), and on 4 young which I trained; on about a dozen pairs of Sparrow Hawks (*Falco sparverius sparverius* and *F. s. phalaena*) with their young, 5 of which I raised and partly trained; and on 3 young Eastern Pigeon Hawks (*Falco columbarius columbarius*), of which I also had the training. In addition, I have had the good fortune to observe with considerable care numerous migrating and wintering specimens of all these species in various parts of North America and the West Indies; and in California, wintering examples of the Western Pigeon Hawk (*F. c. bendirei*). To a lesser extent I am in debt to the literature of both ornithology and falconry, and to the observations of others, especially of Captain R. L. Meredith of Boonton, New Jersey, who has been engaged in falconry for twenty-five years, and has at the moment of writing 2 Gyrfalcons, 5 Duck Hawks, and an Eastern Pigeon Hawk, trained or in training.

The falcons included in this treatment tend (except during migration) to have definite hunting ranges, either centering about the nest in the breeding season, or about some favored day and night perch in winter. The winter location may be kept for the whole season (or several consecutive seasons) or may be changed several times in a year.

If there is a plentiful food supply, the hunting area is not commonly changed and tends to be confined to the least possible radius. The Duck Hawk and Prairie Falcon eat once a day if the first quarry captured is large enough to fulfill the day's needs. The Pigeon Hawk has two meals a day, and the Sparrow Hawk feeds more or less irregularly and continuously, at least when preying on insects. One or two extensive soaring flights of from 20 minutes to an hour and a half are made each day, depending in number and duration, apparently, largely on the weather. The hawk spends a large part of each day on a perch, nearly motionless, except that the head is turned constantly so that the eye may follow every moving object that comes within the range of vision.

If food is scarce, the above routine may be very much altered. The soaring flight, if undertaken at all, may be interrupted for hunting at any time, and the perch is frequently changed.

During the nesting season, the feeding behavior shows individual, and to some extent, specific variation. In general, both parents incubate, by turns, and secure their food while off duty. While the young are in the nest, or at least during about the first three-fifths of this time, the male does all the hunting and the female all the feeding and brooding of the young. The male may bring the food to the nesting ledge or hole, or he may transfer it to the female in the air by turning on his back as the female stoops at him from above, thus allowing the female to take the quarry held in his feet.

Birds almost always, and mammals and lizards frequently, are headless when brought to the nest. It appears as though the male (particularly of the Duck Hawk) lives largely, if not exclusively, on heads of the prey animals during this period.

Quarry are carefully plucked (birds) or skinned (mammals and lizards) before being given to the very young nestlings; the latter thus obtain practically no pellet-forming material. The female becomes progressively less careful, and progressively larger species of prey are fed, as the young grow older, but they are not presented with entirely unprepared quarry until they are nearly ready to leave the nest. Thus, pellets found at or below a nest are likely to have been formed in the stomach of the mother, though they may represent also the food of the young, until very near the end of the nesting period. The young continue to obtain at least some food from the parents after leaving the nest, for from two weeks (Pigeon Hawk, Sparrow Hawk) to a month (Prairie Falcon, Duck Hawk) or even six weeks (Duck Hawk).

The adult falcon's diet depends mainly on three factors: (1) availability, (2) species habit, and (3) individual habit.

Availability is always an important factor, but becomes even more so during the nesting season. At that time a very mixed "bag" often results, anything capturable being taken.

The Duck Hawk and the Pigeon Hawk have a specific antipathy to capturing food on the ground, and if not too pressed by hunger will usually attempt to frighten a standing or swimming bird into flight before actually seizing it. The Prairie Falcon, on the other hand, and even more the Sparrow Hawk, seems to prefer to make its capture on or near the ground, and it will usually pass up a bird well on the wing in favor of something still at rest or just getting started. It is only when mammals (insects, in the case of the Sparrow Hawk) are unavailable that birds are taken by these species in large numbers. Tyler (*Condor*, 25, 1923, pp. 90-97) states that in the western San Joaquin Valley the Prairie Falcon much prefers small birds. In this case, however, it was the abundant, ground-living, low-flying forms that were mainly preyed upon, and these I would expect to be the most acceptable avian substitutes for small mammals, if the latter were comparatively scarce. Unfortunately, Tyler does not mention the local mammal fauna in his paper.

It appears to be quite difficult for the very limited mind of a young falcon to grasp the fact that a live bird or mammal may be converted into food. The lesson must be learned over again for every species of prey of very different appearance. It is perhaps as a result of this, at any rate I have found it true, that falcons, both wild and trained are prone to form prey habits, and to confine the food taken to a single species or group as exclusively and as long as may be. When the chosen food gives out, through migration or whatever cause, a new item is selected and followed with the same single-mindedness.

Generally speaking, the falcons eat perched, either where the prey is captured, or on some convenient vantage point to which it is carried. An insect or other very small quarry may be consumed in flight, or a feeding bird may finish a meal in the air if frightened from its perch. After each third or fourth mouthful the falcon raises its head and looks around, often watching for a minute or more before going on with its meal.

Unlike an owl, a falcon seldom eats anything whole, no matter how small or soft it may be. Small creatures are grasped in one foot and held up toward the beak. Not infrequently the upper end of the tarsus is rested on the perch, the effect being much like that of a man resting his elbow on the table while he grasps a banana. Larger quarry is stood on, being held especially by the inner claw of one foot or of both. Small morsels are bitten or pulled off by the beak, and bones are usually broken (by the bird twisting its head) while they are still attached to the body. If a large piece of bone comes off with a morsel, it is rolled with the tongue and frequently

bitten with the edge of the beak until broken up. If it can not be thus broken, it is grasped with the foot again, if of convenient size and shape, or it is at once discarded.

A large piece of meat is likely to be impaled on the point of the beak and give the eater much trouble. Small morsels are carried on the upper surface of the tongue to about the middle of the beak, and there stick to the "roof of the mouth." The next stroke of the tongue passes under the morsel until the back of the tongue, just anterior to the glottis, can catch it and carry it back into the throat. The morsels may pass one by one into the crop, or become jammed in the upper esophagus. Feeding is then temporarily stopped while the bird hunches its shoulders, stretches and retracts its neck, and swallows hard.

Insects are, of course, known to be of some importance to the Pigeon Hawk and Prairie Falcon as well as to the Sparrow Hawk. I have seen even Duck Hawks, especially young birds just learning to fly, catch grasshoppers and perhaps other forms. The insect is seized in one foot and held up. If the bird wishes to adjust the position of the insect, it transfers the latter to the beak and back to the foot with great quickness. The head of an insect may be swallowed whole by the larger birds, but the thorax and abdomen are much crushed. Insect wings and legs may be eaten, but are perhaps more often discarded. It is surprising to see with what dexterity so large a bird as a Duck Hawk or Prairie Falcon can catch and handle an insect not much over an inch long.

I have not observed a Duck Hawk or Pigeon Hawk feeding on a reptile, but the Prairie Falcon and Sparrow Hawk ordinarily seize a lizard about the middle, or just behind the forelegs, and crush the head with the beak. The head is usually partly or entirely eaten. More or less of the body skin is pulled off and discarded, and the body is eaten in small sections from before backward. The feet are commonly eaten unskinned. The tail, if not already autotomized by the lizard, is often discarded.

Birds are handled variously, depending largely on their size in relation to that of the falcon. A very small bird is seized in the air or on the ground and killed, as are all birds, by biting through the neck vertebrae. The head and part of the neck is well crushed and then eaten, feathers, beak and all. The two smaller falcons often reject the beak of even the smallest quarry. The hawk then plucks its prey with considerable care, attempting to reject all the feathers as they are removed. Primaries, tail and other large feathers are usually successfully discarded, but the breast feathers and to some extent other body feathers, especially if they are wet, stick to the beak, and if there is not a stiff wind blowing to carry them away, are, after much head shaking, swallowed. A falcon which is exceptionally hungry, or a captive bird which has had no pellet-forming material for some days will be much less careful in this respect and will even appear to eat some of the feathers on purpose. A Duck Hawk seems to pay little heed to the position of a sparrow's body and will begin to feed on whatever side is up when the plucking is finished. The whole bird is usually eaten, including the tarsi, which are broken in several places, and the feet. Rarely is part of the gut rejected.

Birds somewhat larger—more than a meal for the falcon—may be seized in the air and killed in the same manner as the smaller birds, or they may be struck with such force that, because of their greater inertia, the claws of the hawk rip right through them and fail to hold. In the latter case, the quarry is often killed outright by the blow and is caught as it falls or after it reaches the ground. Even though the quarry is already dead the neck is usually broken, perhaps through habit. The breast, most of the sternum, the lungs, the heart, the liver and some of the gut of a fair-sized bird are often eaten. It is not unusual for the breast and belly alone to be plucked.

A bird too big to carry is almost never plucked entirely, though such prey is rather infrequently killed except by the Pigeon Hawk. The beaks of medium to large avian quarry ordinarily are rejected unless unusually small and soft, but one or both feet of birds up to about one-half the weight of the hawk are swallowed with surprising frequency.

Small mammals are seized much as are small birds, though killing is perhaps more often effected by crushing the skull rather than by biting through the neck. The head is eaten first and then the rest of the animal. If the creature is tender-skinned, the skin is torn off in strips. If the strip of skin happens to have the fur side against the bird's tongue it is usually rejected; if the flesh side, it is often swallowed. Most of the gut ordinarily is discarded. The tail of a mouse is usually swallowed, often still attached to one of the hind legs. Tough-skinned small mammals usually have the skin peeled back from the severed neck in one piece. This appears not to be a planned action, but to result from aimless pulling at the resistant skin, and purposeful attack on the exposed flesh.

Mammals too large to seize safely are usually killed, at least by the Duck Hawk and Prairie Falcon, by a series of stoops at the head and neck, made at such speed that the claws do not hold. These stoops are repeated until the quarry is stunned or blinded, or until the skull is fractured or the neck dislocated. So far as I know, no species of falcon habitually hunts prey necessitating such tactics when smaller game is available.

The pellet-forming material consists of chitin and keratin and related substances, and also of seeds and other non-protein crop and gut contents of the prey. The following are included: The exoskeleton of insects and other invertebrates; the scales and claws of reptiles; the beak, feathers, tarsal and foot scales, claws, and gizzard-lining of birds; and the hair and claws of mammals. Bones and teeth are usually completely digested. An adult captive falcon fed an artificially high proportion of bone for some days may regurgitate a little, but this is rare, and must be still rarer in wild birds. I have not been able to get a growing falcon to regurgitate any bone, no matter how much it has been fed.

Regurgitation of a pellet by a wild falcon under normal conditions occurs every morning, ordinarily shortly after dawn, and in winter usually at the place where the bird spent the night. In summer, with daylight coming early, and with the young needing food, hunting may begin before regurgitation. I have seen pellets produced by Duck Hawks twice, and by a Prairie Falcon once, while the birds were on the wing. In addition, the Sparrow Hawk and Pigeon Hawk may regurgitate a second pellet in the middle of the afternoon if the morning's meal was eaten sufficiently early.

In analysing collected pellets of falcons, those containing any appreciable quantity of bone should be discarded, especially if whole bones are present, unless there is absolute certainty of origin.

Mammal-containing pellets may be determined, at least to species, by the usual methods of hair examination; but a knowledge of the local, small, diurnal mammals will greatly lighten the work, since the most common available forms in the immediate vicinity will account for the great majority of the pellets. If there is accurate knowledge of locally occurring subspecies, it will usually be possible to name the pellet contents with considerable certainty, for it must be extremely rare for a resident bird to hunt far enough afield to capture other than the local form.

Many published records of falcon pellets simply say "small birds," "large birds," or even "feathers." Where bird species are very numerous around a nesting site, or where a dozen species and subspecies of small finches are wintering together, it may

often be impossible to go further, but in many winter or summer falcon ranges, accurate identification of pellet material, at least to family or genus may be made, and not rarely to species or even subspecies. The bulk of the feathers in a pellet are usually from head, neck and breast. These feathers may be slightly altered in color, but apparently not in pattern, if any exists. Frequently the beak or claws or both are present and are useful in identification. A knowledge of local distribution and habitat will help narrow the field, as in mammals, and it should be remembered that cover-haunting birds are not ordinarily available to any falcon. Finally, at a given site there may be a dozen or so pellets of exactly the same color, size, and consistency. Two or three of these may be positively identifiable through beak, claws, primaries, etc. Since falcons so habitually pursue one species of prey at a time, there is an extremely strong likelihood that the beakless and clawless pellets of the lot represent the same species as the others, especially if from state of dryness and weathering they seem to form a compact age series.

Similar deductions may often be made from the scales of reptiles, especially since the skin of one or more feet of a lizard may often be floated out of a pellet almost entire. Insects may be counted, and at least partly identified, by the very resistant mandibles, even if the rest of the head is broken beyond use. Other parts of insects in recognizable condition are of irregular occurrence in falcon pellets.

Oakland, California, December 3, 1935.

STATUS OF THE CORMORANTS OF GREAT SALT LAKE

WITH TWO ILLUSTRATIONS

By WILLIAM H. BEHLE

In a recent article dealing with the history of the bird colonies of Great Salt Lake (Behle, 1935, p. 32) attention was called to the fact that the fourth edition of the A. O. U. Check-list (1931, p. 23) indicates that the cormorants of Great Salt Lake belong to the race *Phalacrocorax auritus albociliatus*, while elsewhere they are found designated as *P. a. auritus* (see Lewis, 1929, pp. 7, 9, 10, and Peters, 1931, p. 86). In order to test out this matter of subspecific status, I have sought some breeding cormorants with nuptial plumes. At my request, Mr. Milton T. Rees of Salt Lake City obtained several specimens from Egg Island, Great Salt Lake. Three of these, taken on April 19, 1935, were sent to the Museum of Vertebrate Zoology, at Berkeley, and three reached the Department of Zoology at the University of Utah. These six breeding examples have now been examined by me.

The Pacific coast race, *albociliatus*, as the name indicates is characterized by having white nuptial plumes, these in groups or "crests" on the sides of the head above and behind the eyes—at least plumes in which white predominates. In the eastern race, *auritus*, these plumes are predominantly black. I find that the black plumes predominate in the birds from Great Salt Lake. A great amount of variation, however, is observed in these specimens as to color and number of plumes.

These diagnostically important nuptial plumes are of course "ornaments" of the breeding season and are acquired anew each year in the spring, starting to appear in March. They are worn by both sexes but are larger on the males than on females. According to Lewis (*op. cit.*, p. 58) they do not appear until a bird is nearly three years old, and there is usually not a marked development of crests until the fourth

year. This perhaps explains the absence of crests on many individuals even at the height of the breeding season.

In detail, the nature of the crests of the six specimens in question is as follows. No. 67008, Mus. Vert. Zool., ♀, has no trace of plumes. One or two worn light gray feathers on the sides of the breast give an indication that the bird is not an old adult, and this probably explains the absence of the plumes. No. 67009, ♂ adult, has but three plumes on the right side, all of which are white, while on the left side there is only one plume and it is black. No. 67010, ♂ adult, has one plume only on either side, each being black. The University of Utah specimens proved to be more enlightening. No. 2485, ♂ adult, has four plumes on the left side of the head; all are black except one which is white at the base with the tip black. On the right side are twelve or more plumes, all black except one which again is white at the base and black at the tip. No. 2484, no sex mark on tag, has no plumes on the left side and only one black one on the right side. No. 2486, no sex mark on tag, apparently is not an adult, as indicated by many juvenal feathers on the neck and upper breast. Even so, this individual has great tufts of plumes, about thirty individual feathers on each side, and all are black.

Since so much emphasis must necessarily be placed on the color of the plumes in establishing the subspecific identity, and since the situation is often complicated by the absence of crests or by mixed plumes when crests are present, one or two specimens, even though they have plumes, may not be sufficient material for determining the race to which they belong. It is requisite that a series of skins with plumes be available. The mixed black and white plumed condition was noted years ago by Baird, Brewer and Ridgway (1884, pp. 151, 152). They remark that there is "a gradual change from uniform glossy black nuptial crests, in eastern birds, to crests entirely pure white, or with merely a slight admixture of black in Pacific coast examples; specimens from the interior of the continent having the tufts mixed black and white."

The mixture in the Great Salt Lake series has now been discussed. A somewhat comparable situation exists in a series of birds from Salton Sea, Imperial County, California, which series as a whole is referable to *P. a. albociliatus* on the basis of predominance of white plumes. Certain individuals of this series possess all black plumes, while still others have a combination of black and white. Even single specimens from the Pacific Coast may be misleading as to this feature, as shown by no. 4410, Mus. Vert. Zool., ♂, from the Farallon Islands, which has as many black as white plumes. In spite of all this general variability of the plume color, the predominance of black in the Great Salt Lake cormorants justifies, I think, on this score alone, calling them *P. a. auritus*.

In addition to the systematic aspects here discussed, there are other considerations worth reporting in connection with the Great Salt Lake cormorants. It seems strange that there should be an outlying colony of the eastern race of these birds in northern Utah. Whither they migrate is still unknown. Birds were banded on Egg Island in 1933 by J. W. Sugden and also in 1934 by me, but no returns have been reported.

The nesting of the cormorants at Egg Island shows adaptation to local conditions where a low rocky terrain exists (see fig. 15). The nests have been built on or among the large rocks which are often used as supporting bases. Each nesting site has been used year after year, and apparently new material is added each season. At the present time the majority of the nests are a foot or more high; the lowest found was six inches high, the tallest measured twenty-two inches from its base. Each nest is fairly uniform in outer diameter and is 1½ to 2 feet across (fig. 16). The sticks



Fig. 15. Nests of Double-crested Cormorants on Egg Island, Great Salt Lake, Utah; May 18, 1932.



Fig. 16. Young Cormorant in nest at Egg Island, Great Salt Lake, Utah; May 18, 1932.

are interwoven and are white-washed with excrement. The sticks must have been carried from the mainland, or from the larger Antelope Island near-by, since Egg Island is devoid of such material.

In spite of the low level of the lake, the island itself is still (April, 1935) surrounded by water affording some isolation and protection. Food in the form of the preferred non-game types of fish is abundant in the region of the lake. Yet the cormorants are declining steadily in numbers. This is shown by the abandonment of Dolphin Island as a nesting site and the reduction in numbers on Egg Island from 500 in 1915 to possibly 114 in 1935. Also only a few birds still breed at the Bear Lake colony, whereas hundreds were there a few years ago. One reason for the decrease is disturbance of the nesting colonies by boating parties.

During the breeding season of 1935 at Egg Island the cormorants were nesting with Treganza Great Blue Herons and California Gulls. On April 10, Mr. Rees counted 57 cormorant nests with eggs. There were most commonly 4 eggs in a nest. During the few minutes he was on the island about two dozen cormorant eggs were destroyed by gulls. At this time there were also noted 11 heron nests with eggs. Hundreds of gulls were flying about, but apparently not yet nesting. On April 19, there were only 48 cormorant nests with eggs, and but 6 heron nests occupied. On this last date Mr. Rees and his companion arrived by boat at the same time that a party of students waded to Egg Island from the nearby Antelope Island, which is now connected with the mainland. The crowd remained about two hours on the tiny island. The gulls were given an excellent opportunity to levy on the eggs, an opportunity which they made the most of. Also many young cormorants and herons succumbed from exposure to the heat of the sun. Just such occurrences as this, repeated year after year, are contributing to the decrease of the cormorants and herons on this island.

By way of summary, then, the evidence indicates that the Great Salt Lake cormorants are to be identified as of the race *auritus*. The most important differentiating character between *auritus* and *albociliatus* is the color of the nuptial plumes, and those of the Great Salt Lake specimens are predominantly black. The numbers of breeding cormorants in the region are steadily decreasing and extinction is threatened.

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Museum of Vertebrate Zoology, Berkeley, California, September 15, 1935.

UP-HILL PLANTERS

By JOSEPH GRINNELL

The second week of October, a year ago, found me nature-watching on the western slope of the southern Sierra Nevada. I was walking along the road which leads up to Sequoia National Park, when, as the morning sunshine began to increase the warmth and dryness of the atmosphere, I began to note the sounds of falling and bouncing acorns. For, at the level where I was, about 5000 feet, the black oaks were just then yielding their annual crop of seeds. It would seem that these seeds are finally loosened from their cups, if not disturbed otherwise, when the air each day has reached a certain measure of dryness.

The mountain slope was steep, 25 to 45 degrees; and along about ten to eleven o'clock the sound and sight of descending acorns was impressive. They were even accumulating in appreciable windrows in places along the inside of the road next to the bank; now and then one, from source far up-slope, having gained extra momentum, bounced clear over the road and proceeded on its way toward the canyon bottom far below.

Acorns are smooth-shelled, heavy objects, and those of the black oak in particular, are of rotund shape. These qualities make for insecurity of placement on any slope upon which they fall, until in their movements they reach some arresting crevice, or some sufficiently wide strip of level, or nearly level, ground on which to find lodgment.

It was clear to me that the direction of seed scattering from any one oak tree was here well-nigh directly down-hill. In that place and on that day I saw no acorn moving *up*-hill. Gravity alone was acting as the agency of distribution. There appeared no possibility that *wind* could serve as an agent of elevation, as with seeds of such trees as maple, cottonwood and willow. In the case of the oaks, it might therefore seem, the only possible direction of general forest spreading through time would have to be through the action of gravity and streams of water, always down-hill. But how, then, could forests ever have spread, naturally, so as to gain altitude on our many mountain sides?

The next two days, October 12 and 13, my companion, Dr. Eric Hill, and I spent seeking pocket-gophers down near Three Rivers, about 1000 feet altitude, in the valley of the lower Kaweah River. Here another kind of oak, the blue oak, abounded, and we observed that there was a fairly good crop of its acorns, though not borne as uniformly as those of the black oak in the life-zone above. Very many of the blue oaks had produced no acorns that season. Especially was this true of the trees far up the hillsides above the valley bottom. Some of the trees had produced a few acorns. Those trees which were bearing most heavily were those of larger, thriftier-looking condition, down toward the river bottom. Of certain possible bearing on our problem, this season was a dry one; and furthermore it was the latest of a series of dry years.

As we tended our trap-lines, run in all the different types of soil within reach, we became aware of the presence and especially the activities of California Jays (*Aphelocoma californica*). These activities looked into, became of deep significance to us; for here, indeed, was the agency at this particular place, at this particular time, of transportation of acorns up-hill. The jays we saw to be centering their interest in those most abundantly fruiting trees down in the bottom of the canyon. There the birds were gathering the acorns and carrying them up the slopes, to be ensconced in various hidey-holes, some of them to be buried, after the well-known

blue-jay tradition, in the ground of open spaces on the hillsides. From morning to evening, individual birds were almost constantly in sight when we looked out of the auto cabin where we worked, 150 yards from the river.

Every bird going up-slope bore an acorn lengthwise in its bill; every bird in return course was empty-billed. If I had only thought of it, here was a chance for counting birds, and their loads, in sight, during, say, a three-hour period; and then computing the bushels of blue-oak acorns being elevated by the jays perhaps hundreds of feet each October day in that one valley.

In this same locality of observation, Dr. Hill and I saw "digger" ground squirrels busily gathering acorns that had fallen to the ground, carrying them in various directions (with these animals, however, irrespective of direction of slope) to their burrows or to their shelling stations. Twice we watched a ground squirrel climb up a blue oak to the larder of a group of California Woodpeckers, filling its cheek pouches with the acorns they had gathered and stored, even though being attacked by the resentful birds. Then the squirrel would go precipitately down the trunk and off to its own cache in the ground.

Observations of the type just cited, gathered into notebook and memory from many parts of California, have led me to generalize concerning the paramount agency of vertebrate animals in the dispersal of trees, especially of oaks. My recollections bring into this credit column, not only California Jays, woodpeckers, and ground squirrels, but also gray squirrels, chickarees, chipmunks and wood rats, and Steller Jays and Band-tailed Pigeons. In reflecting upon this matter, we can see readily that the relationship is of reciprocal benefit; all of these animal agents of seed dispersal are supplied, at least in part, by the oaks with food, or shelter, and (or) nursery sites. The trees produce crops of nutritious seeds—each seed nutritious either to the prospective oaklet or to the animal that eats it—in vast excess of immediate seeding needs. There is enormous seeming extravagance on the part of the trees, far and away greater production than would be needed to provide for persistence of the species, *if* the species were of fixed geographic position through time. Granting an individual longevity of 75 to 300 years for more or less mature oaks of one kind and another (I cite Jepson, *The Silva of California*, 1910, p. 57), perhaps one successful germination to only a million acorns would provide for mere forest replacement. Even this ratio is probably far too high. The point I wish to make is that in the long-time interests of the tree species, involving locomotion of the whole forest, there is value received upon this huge rate of production. It is not extravagance, but good investment, for the oaks to provide subsistence for a continuing population of animal associates.

Even in any relatively brief period of years, catastrophe may overtake the fortunes of the oak forest. Fire of great intensity may destroy all of the growths on a given slope clear to the top of the ridge. Then quick recovery—early repopulation by the oaks—will likely be dependent upon the survival and germination of acorns buried previously by animals, in open places, where the heat was least effective, as also upon the year-by-year marginal replanting process just described. I think especially of California's great erosion-guarding and water-conserving chaparral belt, of which the live oaks and scrub oaks of several kinds are prominent constituents—and their constant animal attendants, the California Jays, the chipmunks, and the dusky-footed wood rats.

Giving again to our scientific imagination fair rein, let us think of the oak belts of California in longest time vista—back through not only centuries, but millenniums. Also let us think of the, to us invisible, climatic boundaries which at any one time-

level hem in those belts, each belt characterized by a different species of oak. And let us further think how these boundaries have shifted in past time spatially, as borne upon by changes in physical conditions affecting climate—those involved in repeated elevation and depression of the land surface, and in shifting of prevailing air currents. We can then think of the oak belts, as slowly marching, through time, up hill and down dale, southward and northward, as their species have been driven by the gradually shifting exigencies of physical requirement which determine where new trees can not only sprout, but mature. Again, we must think, not of the individual tree up to 300 years old, but of the aggregate of trees involving long series of generations of their kind. Such time-space aggregation has been *forced* to move from place to place. It has literally *had* to keep up with the procession. It has *had* to provide ways and means of insuring transportation, or else be wiped out through complete failure at any one level, of those favoring factors which have to do with the existence of each kind of oak in its own life-zone. Tree species have had to move their location from one period to the next or die in a struggle against oncoming adverse conditions.

Here, then, is where a certain portion of the associated animal life has come into the service of the oak species. In the present era, with life-zones probably advancing northward, and up-slope, we can think of the successive belts of valley oaks, blue oaks, golden oaks, black oaks, and huckleberry oaks, on our western mountain-sides, as relying, most especially for that part of their dispersal comprised in elevation, entirely upon their bird and mammal associates. And there obtains that vital exchange of benefits to which I alluded. Plant-animal communities, eventually closely knit in their specific interrelationships, have been subject to evolutionary processes quite as definitely as discrete species.

Note.—An adapted version of this account was included in a radio talk published in *The Scientific Monthly* (XLI, December, 1935, pp. 553-556). Permission to reprint the matter duplicated here has been received from the Associate Editor of the journal cited, Mr. Ware Cattell.

Museum of Vertebrate Zoology, University of California, Berkeley, October 22, 1935.

SUMMER NOTES FROM PLUMAS COUNTY, CALIFORNIA

By JOSEPH EWAN

Two papers published, by A. P. Smith (*Condor*, 20, 1918, p. 45) and by Joseph Mailliard (*Proc. Calif. Acad. Sci.*, ser. 4, 13, 1923, p. 29), deal briefly with the notable birds of the region about Quincy, to the north of the area here under consideration. In addition, Margaret W. Wythe has written upon "Some birds of the Gold Lake District" (*Condor*, 29, 1927, pp. 61-66), a region some two thousand feet above the present locality, in the Canadian and Hudsonian zones. Mohawk Valley, with which I deal, is, on the other hand, a locality of Transition Zone complexion, freckled with Great Basin species.

In the course of work as nature counselor at Y.M.C.A. Camp Caldwell, near Blairsden ("Dentens" on Downieville U.S.G.S. Quad.), Plumas County, the author enjoyed intermittent opportunities to note the bird population of the region. My attention was divided among several duties, but observations were made from June 24 to July 18, 1934, chiefly upon early morning trips with small groups of boys.

The area covered by these notes extends from the town of Blairsden east to Portola (approximately "Kerby" on the Sierraville U.S.G.S. Quad.), roughly ten miles

distant. The dominant topographic feature is the Middle Fork of the Feather River. The highest point to the east is Penman Peak (7280 feet), and to the west are the somewhat higher Mills and Haskell peaks, with the Gold Lake district beyond. Above Portola looms the strongly isolated landmark, Beckwith Butte (7248 feet). To the east of Portola lies Sierra Valley, comprising the chief source of the Middle Fork. The floor of Mohawk Valley and of the merging Humbug Valley in which lies the town of Portola is fairly level and has a gentle gradient of from 4500 feet at Blairsden to 5000 feet at Portola, ten miles upstream.

The slopes of Mohawk Valley are prominently clothed with veteran western yellow pines, though lumbering activities are continually decimating their stands. The two sides of the valley are remarkably unlike vegetationally, however, with the Transition or weak Canadian species often a conspicuous feature of the west slope, and with arid Transition, having a strong Great Basin expression, on the more arid eastern slope of the valley. Thus huckleberry oak occurs on the west side, California black oak, *Garrya* and rabbit-brush (*Chrysothamnus nauseosus*) on the east but not on the west slope; white fir is not uncommon on the west but almost wholly absent on the east side. Great Basin sage-brush (*Artemisia tridentata*) and antelope brush (*Purshia tridentata*) spread down as far as Blairsden from the Portola area where they are dominants, that region being conspicuously Great Basin in its floristic aspect. The Middle Fork of the Feather River is bordered near the camp by willows, black cottonwood, and mountain alder (*Alnus tenuifolia*), with thickets of herbaceous water-loving plants. This river thicket habitat, or riparian association, is exactly illustrated by the photograph of "Battle Creek at 4800 feet" in the Lassen Peak region, in the Vertebrate Natural History of the Lassen Peak Region (Univ. Calif. Publ. Zool., 35, 1930, p. 25, fig. 15). Just below camp the river broadens to form meadows and what is locally designated "the bog," a treeless, well-flooded area with such plant species as *Eleocharis*, *Deschampsia caespitosa*, *Senecio hydrophilus*, *Carum gairdneri*, *Cicuta vagans*, and *Epilobium glandulosum*.

The following bird species were noted on the floor of Mohawk Valley or on the west slope of Penman Peak, which is well covered with sage-brush on its south and west sides and upper slopes. Single dates indicate the only occasions when these were seen. To make possible correlations with Wythe's paper on the Gold Lake district the species are arranged by association. Since no forest association as such exists in the area, even the oldest and most nearly virgin stands of pine being rather open and freely interspersed with such chaparral elements as mountain elderberry, squawmat (*Ceanothus prostratus*) and manzanitas, only three associations are considered: mixed forest-chaparral association; riparian association; meadow association.

MIXED FOREST-CHAPARRAL ASSOCIATION

Cooper Hawk (*Accipiter cooperii*). Penman Peak road, July 6.

Mourning Dove (*Zenaidura macroura marginella*). Singularly scarce; July 6.

Great Horned Owl (*Bubo virginianus* ssp. ?). At camp, July 8. Presumably on margins of range of *pacificus* and *occidentalis* at this point.

Calliope Hummingbird (*Stellula calliope*). Frequent *Gilia aggregata*.

Red-breasted Sapsucker (*Sphyrapicus varius daggetti*). Grove of young yellow pines near camp, June 29.

Hairy Woodpecker (*Dryobates villosus orius*). On yellow pines at camp.

White-headed Woodpecker (*Dryobates albolarvatus*). Frequent about camp; commonly feeding on upper half of pine boles, whereas the Hairy Woodpecker often works down to within ten feet of the ground.

Violet-green Swallow (*Tachycineta thalassina lepida*). Nest located along Frazier Creek in dead black cottonwood. Creek borders camp.

Blue-fronted Jay (*Cyanocitta stelleri frontalis*). Permanent food supply doubtless concentrated the population about camp.

Mountain Chickadee (*Penthestes gambeli abbreviatus*). Frequent about camp.

Pigmy Nuthatch (*Sitta pygmaea*). On pines about camp; no other species seen in the valley.

Sierra Creeper (*Certhia familiaris zelotes*). At camp, June 29.

Western Robin (*Turdus migratorius propinquus*). Common about camp; one nest located in a yellow pine sapling 5½ feet from ground in plain sight on an open gravel bar in the river.

Western Bluebird (*Sialia mexicana occidentalis*). Favored the openings among the yellow pines and the railroad "cuts."

California Purple Finch (*Carpodacus purpureus californicus*). A pair seen frequently along Frazier Creek near camp. Linnets absent!

Pine Siskin (*Spinus pinus*). A pair loitered about the camp spring, June 24.

Green-backed Goldfinch (*Spinus psaltria hesperophilus*). At Guidici Ranch, Penman Peak road, July 6, foraging about the barns.

Green-tailed Towhee (*Oberholseria chlorura*). Familiar and confiding about camp, feeding with robins and juncos about the camp tables.

Sierra Junco (*Junco oreganus thurberi*). Common throughout the area. One nest discovered on rafters of an old hay-filled barn.

RIPARIAN ASSOCIATION

Farallon Cormorant (*Phalacrocorax auritus albociliatus*). Single transient fishing along the river near camp, permitted an approach to within twenty-five yards, July 15.

Sharp-shinned Hawk (*Accipiter velox*). Occasionally seen.

Killdeer (*Oxyechus vociferus*). River flats near Portola, July 18.

Wilson Snipe (*Capella delicata*). Along river margins in heavy growth of *Carex* and grasses, July 6.

Spotted Sandpiper (*Actitis macularia*). River "beaches," July 6.

Pacific Nighthawk (*Chordeiles minor hesperis*). Observed nightly foraging over a broad section of the river, the "swimming-hole," which offered a considerable expanse of water.

Western House Wren (*Troglodytes aëdon parkmanni*). River flotsam habitat, where a nest was located.

Ruby-crowned Kinglet (*Corthylio calendula cineraceus*). Frazier Creek, July 5, secretive in stream thicket.

Lutescent Warbler (*Vermivora celata lutescens*). Seen almost daily about the willows and *Cornus californica* at the camp spring.

Tolmie Warbler (*Oporornis tolmiei*). Frazier Creek, July 5. [Oddly enough not a single Audubon Warbler was seen in the area.]

Golden Pileolated Warbler (*Wilsonia pusilla chrysocela*). Perhaps the most abundant warbler about camp. One nest located on ground in pine-needle duff eight inches from the path used twice daily by eighty-six campers going to and from a swim! Incubation terminated by destruction of the eggs, not, I believe, by the boys who were wholly unaware of its presence, but by some other agent.

Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). With red-wings along the river flats just below Portola, July 18. Adult males.

Red-winged Blackbird (*Agelaius phoeniceus nevadensis*). Among willows all along the river at scattered points, and about Blairsden ranches.

Song Sparrow (*Passerella melodia fisherella*). Prominent member of this association; one nest located in a stool of *Carex* at river's margin.

MEADOW ASSOCIATION

Western Red-tailed Hawk (*Buteo borealis calurus*). Flying over "bog," July 6.

Sparrow Hawk (*Falco sparverius*). Seen almost daily flying over the bog, commonly a pair seen, one pursuing a red-tail, July 6.

Red-shafted Flicker (*Colaptes cafer collaris*). Small parties feeding in early morning on ground of wet meadows. Common.

Olive-sided Flycatcher (*Nuttallornis mesoleucus majorinus*). Fond of dead tops of yellow pines along the margins of wet meadows where found with reliable frequency.

Western Robin (*Turdus migratorius propinquus*). Conspicuous about meadows where were apparently located feeding grounds for birds nesting in pines.

Mountain Bluebird (*Sialia currucoides*). At Guidici Ranch, July 6.

Western Meadowlark (*Sturnella neglecta*). Three nests located, July 6.

Brewer Blackbird (*Euphagus cyanocephalus minusculus*). About Blairsden and Portola meadows, in territory apart from red-wings.

Savannah Sparrow (*Passerculus sandwichensis nevadensis*). At meadow about old barn on Blairsden road from camp, on several occasions.

White-crowned Sparrow (*Zonotrichia leucophrys*). Same locality as last, but only on June 30.

Lincoln Sparrow (*Passerella lincolni*). In full song.

The subspecific approximations are based largely on Grinnell, Dixon and Linsdale's "Vertebrate Natural History of Lassen Peak Region" (*op. cit.*). It is hoped that the area, a provocatively interesting one from the distributional standpoint, may receive a closer examination from a collecting ornithologist, for then the precise subspecific relationships can be established.

Berkeley, California, July 27, 1935.

FROM FIELD AND STUDY

Speed and Eyesight of a Pigeon Hawk.—In an experiment with a female Eastern Pigeon Hawk (*Falco columbarius columbarius*) trained for falconry the bird came at once to the lure from measured distances up to 900 yards. The lure was a flat, padded bag, approximately 3 by 4 by 1.5 inches in size, with a pair of small-bird wings fastened to each flat surface. It was swung in a circle at the end of a 3 foot thong to call the bird; to human eyes at such distances it was perfectly invisible. The hawk was timed in both directions on a nearly windless day over a course of 1542 feet, and it averaged 29.9 miles per hour. It is well known that a trained bird makes no such effort or speed in coming to the lure as it shows in pursuit of live quarry. This hawk seemed, purely by guess, to go about 50 per cent faster in pursuing a live bird.

In comparing it with birds it was attempting to capture, it was observed that the Pigeon Hawk flew faster than quail (*Lophortyx californica*) or Meadowlarks (*Sturnella neglecta*), and more slowly, at least in a rising flight, than Horned Larks (*Otocoris alpestris*). It could catch a shrike (*Lanius ludovicianus gambeli*) in a long course free from cover; it was keener after shrikes than after any other bird. It could catch, bring down and kill a dove (*Streptopelia risoria*), or even a strong adult common pigeon if released within about 50 feet, but was easily outdistanced by these birds after they had attained top speed.

The hawk was often harassed by hummingbirds, sometimes six or seven at once. They flew circles around her. Sparrow Hawks (*Falco sparverius*) usually outmaneuvered the Pigeon Hawk, but few of them seemed to outspeed her. A wild, male Western Pigeon Hawk (*Falco columbarius bendirei*) attacked her one day, kicked several feathers loose from her, and finally drove her to the ground. His speed was greatly superior to hers.—RICHARD M. BOND, Oakland, California, December 3, 1935.

The Brown Thrasher in Utah.—On December 6, 1935, while banding birds in Zion Canyon, at an elevation of 3,900 feet, I twice observed a bird that was thought to be a Sage Thrasher. The next day, December 7, this bird was trapped and banded (number 34-354902). After repeating three times the day following, making possible further study of its markings, the original identification was doubted.

On December 9, the bird again repeated and this time was collected for a specimen. It proved to be a female Brown Thrasher (*Toxostoma rufum*) in rather worn plumage. So far as ascertainable, this is a new record for the state of Utah as well as an addition to the few records west of the Rockies. The specimen (number 114, in the Zion National Park Museum) was made up and identified by W. S. Long, Wild Life Technician, Zion National Park.—HENRY GRANTHAM, Zion National Park, Utah, December 12, 1935.

New Nesting Records for Yosemite Valley.—The chart of daily bird records over a period of thirteen years in Yosemite Valley discloses the fact that the Mountain Bluebirds (*Sialia currucoides*) are not to be expected during the summer months. However, birds of this species may be found in the Yosemite any time between the middle of October and the middle of

May, except during January, for which wintry month there is not a single record. Therefore, Mountain Bluebirds have been considered as transient in Yosemite Valley before and after the nesting season.

In other words, stray flocks of Mountain Bluebirds use the Valley as a loafing grounds on the way to and from their nesting grounds in the high mountain meadows. And strangely enough, while the Mountain Bluebirds come down-mountain to visit the valley, the Western Bluebirds (*Sialia mexicana*) come up the canyon to feast on the crop of mistletoe berries so that both species of bluebirds are found in the Valley at the same season. However, there is very little competition along the forage lanes, as the Mountain Bluebirds feed mostly over the meadows.

After the experience of this year, 1935, we are forced to modify our idea of the status of the Mountain Bluebird, for it is no longer to be considered as purely transient. Two pairs, and possibly three, nested in the grove of cottonwoods at the lower end of Leidig Meadow. The birds were first reported by Walter Fitzpatrick, who saw two pairs there on July 5. The following morning I went to the meadow to investigate and found two pairs of birds hunting over the meadow in true bluebird fashion. On hovering wings they would poise in the air and then dive into the grass. Soon it was discovered that all the birds were carrying food back to the cottonwoods that bordered the meadow. One pair was feeding young already out of the nest. We failed to locate the young of the second pair, as voracious mosquitoes rather discouraged a prolonged hunt. However, two days later we found a second pair feeding fluffy young—young that were apparently just out of the nest, as they were unable to fly more than a few feet at a time. Twice during our several visits with the bluebirds, six adult birds were seen, but only two families were we able to locate. The birds were last seen on July 11.

While we were searching about for the nest hole of the bluebirds we discovered a pair of Slender-billed Nuthatches (*Sitta carolinensis aculeata*) carrying food into an old woodpecker hole. This nuthatch has been found nesting below the Valley in the digger pine country and also above the Valley in the Little Yosemite, but never before have we found a nest in Yosemite Valley.

The nesting on the floor of the Valley of Mountain Bluebirds and Slender-billed Nuthatches would seem to indicate that the heavy winter and the late cool spring had affected the movements individually of some species of birds. Other observations that tend to bear out this theory are now presented.

Olive-sided Flycatcher (*Nuttallornis mesoleucus*). These birds that seldom summer in Yosemite Valley are rather common this year.

Mountain Chickadee (*Penthestes gambeli*). In former years only a few pairs nested on the floor of the valley, this year they are rather common nesting birds.

Mountain Quail (*Oreortyx picta*). For the first time in fifteen years these birds were noted on the valley floor during the month of July.

Lincoln Sparrow (*Melospiza lincolni*). Two pairs nesting in the Valley instead of the usual one, or none.

Spotted Towhee (*Pipilo maculatus*). Not a single bird noted on the floor of the valley this year while always before at least a dozen pairs nested here.

Evening Grosbeak (*Hesperiphona vespertina*). Rarely seen. No nesting pairs noted. Have not been so scarce in the Valley for a number of years.

Rough-winged Swallow (*Stelgidopteryx ruficollis*). The river was so high at nesting time that the usual nesting sites were unavailable.

Violet-green Swallow (*Tachycineta thalassina*). More nesting pairs on the floor of the valley than at any time during the last fifteen years.

Audubon Warbler (*Dendroica auduboni*). Not common, but more numerous on the floor of the valley than they have been in recent years.

Rufous Hummingbird (*Selasphorus rufus*). On July 15 these birds had not yet arrived in the Museum Garden.—CHARLES W. MICHAEL, *Yosemite, California, July 17, 1935*.

Broad-winged Hawk in Idaho.—So far as I am aware, there is no record for the occurrence of the Broad-winged Hawk (*Buteo platypterus*) west of the Rocky Mountains. There is now in the Museum of Vertebrate Zoology a single specimen (no. 67600) collected May 23, 1935, at Castle Creek, 8 miles south of Oreana, Owyhee County, Idaho. This bird, in immature plumage, was killed by a rancher named Bachman, and presented to me.

Since this species of hawk is known to be migratory, its occurrence in this region, some four hundred miles west of its normal range, may be due to the tendency of yearling birds to wander—to explore new territories; or perhaps its mental complex was such that its sense of direction was functioning poorly. A small garter snake (*Thamnophis ordinoides*) was found in the stomach.—WILLIAM B. DAVIS, *Museum of Vertebrate Zoology, Berkeley, California, December 8, 1935*.

A Northwestern Robin Reaches California.—Soon after I published my question "Is the Northwestern Robin Migratory?" (*Condor*, 37, 1935, p. 173), I received from Mr. G. D. Sprot, of Cobble Hill, Vancouver Island, B. C., a most informative letter, setting forth various angles in the problem. Briefly, Mr. Sprot's own experience on Vancouver Island led him to the conclusion that "when prolonged periods of intensely cold weather prevail here, as they do some winters, then *Turdus migratorius caurinus* absents itself entirely until spring. If such weather starts early in December and continues more or less throughout January it usually extends far to the south of us and doubtless [Sprot says] carries *caurinus* before it even unto California. . . . It seems to me you and Jewett will simply have to let *caurinus* into your states in bad weather, for there is no other place for it to go!"

The facts Sprot gives, and the arguments he bases on them, are in themselves just about conclusive. But the clincher is his statement that there is a known "instance of a probable *caurinus* attempting to winter in California." This was altogether news to me. The particulars were not at his hand at the time Mr. Sprot wrote (under date August 22, 1935); so I turned his letter over to Mr. E. L. Sumner, Sr., of the Western Bird-banding Association. The latter at once undertook assiduous letter-writing in various directions. This brought pertinent replies from Mr. Patrick W. Martin, Mr. J. Alfred Flett, and Mr. Frederick C. Lincoln. All this correspondence Mr. Sumner has placed at my disposal and from it I offer the following summary.

On April 30, 1931, Mr. J. A. Flett placed on a nestling robin, band number A354325. This was in his own orchard, 6½ miles from Duncan, in the Cowichan district of Vancouver Island. This bird was accidentally caught in a steel trap of a fur-trapper near Point Reyes, in Marin County, California, "about" January 15, 1932. The report of this "return" came from State and Federal Deputy Game Warden Bert F. Laws, of San Rafael, California, to Mr. George Tonkin, then of Berkeley, whose letter giving these latter details is now in the files of the Biological Survey, in Washington, D. C.

Here, then, is record of a robin that could hardly fail of being of *caurinus* "blood", reaching the northwest coast belt of California in mid-winter. One thing to regret: If only that trapped robin had been preserved as a specimen, then its subspecific characters could have been checked.

—J. GRINNELL, *Museum of Vertebrate Zoology, Berkeley, California, January 5, 1936.*

Occurrence of the Red-naped Sapsucker in Santa Cruz County.—While collecting birds in Scott Valley, Santa Cruz County, California, on December 11, 1934, I secured an adult male Red-naped Sapsucker (*Sphyrapicus varius nuchalis*). The specimen is now no. 68033 in the collection of the California Museum of Vertebrate Zoology.

The breeding range of this subspecies in California lies in the extreme northeastern portion of the state, and the fall dispersal is southward through the San Diegan and Colorado Desert faunal areas and on into Lower California. There are but four previous records for the San Francisco Bay region which the writer has been able to find, and all are more than thirty years old. Of course there has been considerable discussion of the status of this race in relation to the more common Sierra Red-breasted Sapsucker (*Sphyrapicus varius daggetti*), but the specimen under question compares favorably with other winter-taken specimens labelled *nuchalis* in the Museum collection.

The locality of this record, Scott Valley, is situated some five miles north of Santa Cruz in the Santa Cruz Mountains, and is noteworthy for its extremely varied flora and fauna, and for the juxtaposition of life-zones. Many interesting records have come from this section in the past and the occurrence of this bird there adds another. The woodlands fringing the valley abound in woodpeckers of several species.—PAUL F. COVEL, *Oakland Public Museum, Oakland, California, December 4, 1935.*

The Rusty Blackbird in Western Montana.—Early on the morning of November 29, 1935, a flock of six Rusty Blackbirds (*Euphagus carolinus*) appeared at my ranch home near Fortine, in the extreme northwestern corner of Montana. Alighting in a cattle feed-lot, the birds fed upon refuse grain and seeds for about fifteen minutes, while I watched them from distances ranging as close as ten feet.

The two larger birds, evidently adult males, were the darkest in color, being washed with rusty only lightly above, and slightly more strongly below. The bird which appeared to be the smallest in size was much lighter in color than any of the others, being decidedly yellowish-buffy both above and below. The remaining three birds were intermediate between these two extremes both in size and in color, their plumage being strongly washed with rusty. All six birds showed a conspicuous buffy superciliary line.

In Montana this species has been known to occur rarely as a migrant in the far eastern part of the state, but has not previously been reported to occur west of the Rockies, or during the winter season.—WINTON WEYDEMAYER, Fortine, Montana, December 8, 1935.

Shrike Craftiness.—Today (November 18, 1935), as I went back and forth to the clothes line, I was attracted by an unusual bird call. Finally I walked slowly into the vacant lot next door toward the call. I found a shrike (*Lanius ludovicianus*) sitting in the shadow about half way up in a mesquite bush. When I first saw him he was giving a low plaintive call which aroused the curiosity of several birds and drew them toward him, as he had drawn me. They were a mockingbird, a thrasher, an English Sparrow and several House Finches.

He then changed to a whistling call, similar to that of the Abert Towhee, but not as loud. All this time one House Finch was working down through the branches nearer and nearer the shrike, keeping up the usual House Finch talk. The shrike kept his eye on the Finch all the time and began to answer. He carried on a conversation for several minutes, in tones surprisingly like those of the House Finch.

In the meantime the shrike had moved out in the open. I was so fascinated by the shrike and House Finch that I did not notice that the mockingbird had worked around on the ground almost under the shrike. Like a flash the shrike dropped down, striking at the mockingbird, but missed. A chase by the mockingbird ensued.—RUTH M. CROCKETT, 90 Columbus Avenue, Phoenix, Arizona, November 18, 1935.

Northern Records of the Mockingbird.—During the last ten years the list of western Canadian birds has been enriched by the appearance of several unexpected species. Of these one of the most remarkable is the Mockingbird (*Mimus polyglottos*).

On May 31, 1928, the writer was amazed to see a Mockingbird on his ranch (Eastend, Saskatchewan), and on June 4 he collected the bird (*Condor*, 30, 1928, p. 320). This record, however, was not the first; for one was seen on May 2 of the preceding year by Mr. Steve Mann, of Piapot, Saskatchewan, whose farm is about thirty miles north of Eastend. While this was only a sight record, Mr. Mann removed all doubts by securing the next bird he saw, on November 1, 1929.

During 1928 there were several reports of the Mockingbird having been seen in different parts of the prairie provinces, but few, if any, of these reports were substantiated. No doubt many of them were correct, for the species can scarcely be mistaken for any other, particularly if the bird is heard singing. Since that year, a considerable number of Mockingbirds have been seen, and the species can hardly be considered any longer an accidental visitant or straggler.

In 1931 a pair nested at Didsbury in Central Alberta (*Canadian Field-Naturalist*, 46, 1932, p. 67). In 1934 a pair was seen at Wilcox, thirty miles south of Regina, Saskatchewan, that evidently was nesting there. Mr. Mann tells me he noted the Mockingbird in 1932 and 1934 also. In 1935 there were two seen in this neighborhood. Mr. E. H. Knowles, of Regina, informs me that he saw one in 1934, and that more than one pair were seen near Truax, sixty miles south of Regina, in 1935.

In view of all these records for Saskatchewan alone, it is rather surprising to find so few records for the states that adjoin us to the south. Mr. Winton Weydemeyer, of Fortine, Montana, tells me that so far as he knows there are no records of the Mockingbird in that state; and the species is not included by Aretas Saunders in his Montana list (*Pac. Coast Avifauna* No. 14). Mr. H. J. Rust, of Coeur d'Alene, Idaho, writes me that he has no record for the northern part of Idaho, but thinks the bird may appear occasionally in the southern part of the state.

According to Mr. Otto McCreary, University of Wyoming, Laramie, the Mockingbird is a regular breeding bird of southeastern Wyoming, but he has no record for the northern half of the state. Mr. Pierce Brodkorb, University of Michigan, Ann Arbor, has no record for either Wyoming or South Dakota. According to Professor A. P. Larrabee, of Yankton, South Dakota, the Mockingbird is an occasional visitor to his section and other points in South Dakota. Apparently there are no records at all for North Dakota and none is given in recent issues of the *Auk* or *Condor* for that state or for any of the others mentioned.

The writer does not know whether the few specimens, about three, taken in Saskatchewan belong to the race *polyglottos* or the race *leucopterus*, a question which when decided might indicate whether our birds originate from the southeast or the southwest.—LAURENCE B. POTTER, Eastend, Saskatchewan, January 14, 1936.

The Little Blue Heron at Santa Cruz, California.—For a period of about three months, a small white heron has been observed almost daily, feeding along the banks of the San Lorenzo

River within the corporate limits of Santa Cruz, and also along the west shore of Wood's Lagoon east of Seabright. Local observers have called the bird the Snowy Egret (*Egretta thula*), but, as the bird's legs appear to be decidedly *green* instead of *black*, the writer decided that a closer check-up might be interesting.

On January 8 of this year, the writer, assisted by Mr. and Mrs. L. B. Payne, managed to approach under cover of the wooded shore to within forty yards of the heron while it fed near the bank of the lagoon. Through binoculars, a peculiar shuffling movement of one foot was noted, appearing analogous to the scratching of gallinaceous birds, except that the foot movements were executed forward and laterally, instead of backward. In this way the bird drove its prey from cover for an easier capture.

In plumage, the bird was pure white; bill black except that it was much lighter near the base; the lower mandible, especially, appeared somewhat yellowish. The legs were decidedly green with the feet showing yellow. Dr. Loyal Miller (Condor, 36, 1934, p. 178) describes herons observed in Ventura County in 1934 and expressed the belief that they were *Florida caerulea*, not *Egretta thula*. As suggested by Dr. Grinnell in a letter, our Santa Cruz heron is probably the Little Blue Heron (*F. caerulea*), an immature in white phase, similar to the one described by Dr. Miller. This would appear to be the northernmost record to date for the Little Blue Heron.—D. E. DANBY, *Santa Cruz, California, January 9, 1936.*

Fall and Winter Records from the Coachella Valley, California.—While observing Audubon Warblers feeding in cottonwood trees at Mecca, California, on December 8, 1935, the writer's attention was attracted to the cries of birds battling in the crotch of a near-by tree. In the tumbling mass of feathers, the yellow rump of an Audubon Warbler and the black cap of his antagonist were discernible. It was not until the Audubon had been routed and the victor had retired to a near-by limb to regain his composure that we were able to identify the latter as a chickadee. Further observation revealed a number of chickadees feeding in the vicinity. We were unable to estimate the size of the flock, although not over twelve were seen at any one time. One specimen was taken and our determination of the species as the Bailey Mountain Chickadee (*Penthestes gambeli baileyae*) was confirmed.

This flock of chickadees was still busy in the same trees when the writers visited Mecca a week later. On the same date, December 15, 1935, two others were seen in large cottonwood trees bordering a tule-covered reservoir ten miles northwest of Mecca. This locality is approximately eighteen miles by airline from the summit of the Santa Rosa Mountains where in 1908 Grinnell and Swarth found the Bailey Chickadee to be the most abundant species of birds above 5000 feet. Although these chickadees are known to be frequent wanderers to lower levels in winter, we believe this to be the first recorded occurrence of the species on this desert and at 197 feet below sea level.

A Red-breasted Nuthatch (*Sitta canadensis*) was seen in a cottonwood tree on Coral Reef Ranch, Coachella, California, on October 8, 1935, at 45 feet below sea level. When first observed this bird was working down the larger branches of the tree; it came within three feet of the observer's face. This is the first time the writers have known of the occurrence of the species on the floor of this desert valley.

Early on the morning of September 10, 1935, a Slender-billed Nuthatch (*Sitta carolinensis aculeata*) was seen on Coral Reef Ranch. When first seen this bird was hitching around the trunk of a small black locust tree five feet from the house. Observations were made at a distance of ten feet. The bird was driven off by a shrike, but late in the afternoon of the same day it was again observed on the branches of a large cottonwood tree about 200 yards from the house.

This species was again encountered on December 15, 1935, when a single individual was noted on a large willow tree on the edge of a tule-covered reservoir ten miles northwest of Mecca. It was observed for some time systematically working around the larger branches near the top of the tree, flying from the willow to the cottonwoods bordering the reservoir. The season on the desert had been mild and many green leaves still remain on the trees. Typical call notes were heard, but as there were no answering calls there was probably but the one individual in the vicinity. The places varied from 44 to 75 feet below sea level.—BEN CLARY and MARJORIE CLARY, *Coachella, California, December 16, 1935.*

Golden-crowned Sparrow in Zion National Park.—On January 16, 1936, Henry Grantham, CCC enrollee assigned to bird-banding in the Park, brought to the office a Golden-crowned Sparrow (*Zonotrichia coronata*) which had entered one of his traps. It was an adult female, and because of its rarity, it was prepared as a study skin and placed in the Park museum. As far as

I have been able to determine, this is the first record for Utah, as well as for Zion National Park. This bird must have crossed several hundred miles of deserts and high mountain ranges to get here from its normal range. Mr. Grantham says it was in a mixed flock of Gambel Sparrows (*Zonotrichia leucophrys gambelii*) and Mountain Song Sparrows (*Melospiza melodia fallax*).—W. S. LONG, Zion National Park, Utah, January 26, 1936.

Red-shafted Flickers Feeding on Aphids.—On the morning of November 14, 1935, my attention was attracted to the peculiar actions of a Red-shafted Flicker (*Colaptes cafer collaris*), outside one of the windows of a classroom in Hilgard Hall, University of California, Berkeley. It was attempting to perch near the end of a branch of a large shrub, but apparently the branch was not rigid enough at that point to support the bird's weight. It persisted in its attempts and grasped the branch in its feet, spasmodically beating its wings in an effort to maintain an upright position. However, the branch continued to bend until the bird was upside down. After a few minutes the struggle to gain a normal perching position ceased, but the flicker continued to cling to the branch and began to peck at the under side of the leaves and the branch.

I was able to approach quite close to the window without being seen by the bird and observed it for approximately half an hour. I noted from its brown malar stripes, or "mustache," that the bird was a female. The shrub is about fifteen feet from the building and the branch to which the flicker was clinging was about twelve feet above the ground. I suspected that it was feeding upon some kind of insect which probably was abundant on the shrub, as evidenced by the length of time which the bird remained there, repeatedly pecking at the under side of the foliage in kinglet fashion.

Three times the bird lost its hold on the branch, but returned each time. However, after the first mentioned occurrence, it no longer attempted to maintain itself upright, but immediately assumed the inverted position and resumed its feeding. A sudden move by myself caused it to take alarm and fly off.

Noting the position of the branch on the shrub, I immediately went out to investigate and found that practically all of the branches, near the ends, were literally infested with aphids (*Aphis* sp.). Upon pulling down the particular branch on which the flicker had been, I found that it had only a few aphids left on it.

In the afternoon I carefully approached the same shrub to see if the bird might have returned. Upon my arrival I found not one, but four individuals feeding there in the same manner as had the one in the morning. The following morning there were three flickers there, but none when I visited the site in the afternoon.—JACK C. VON BLOEKER, JR., Museum of Vertebrate Zoology, Berkeley, November 16, 1935.

The Range of the Sharp-tailed Grouse in New Mexico.—Mrs. Vernon Bailey in her work on the Birds of New Mexico (p. 210) records the Columbian Sharp-tailed Grouse (*Pediocetes phasianellus columbianus*) only from Johnson, Barillo and Fisher Peak Mesas, east and northeast of Raton, from information secured by Mr. J. S. Ligon. As indication of a more extensive range in earlier times I wish to record the distal part of a tibiotarsus of a Sharp-tail identified in a considerable collection of bird and mammal bones collected during archeological work in a cave near Jemez Springs, New Mexico, and received for identification from Mr. Paul Reiter, Curator of the Museum of New Mexico at Santa Fe. Associated with the specimen were numerous bones of turkey and of dusky grouse, and fragments from a teal of the genus *Querquedula*, a hawk of the genus *Buteo*, the American Merganser, and the Great Horned Owl. The cave seems to have been used by Indians as a temporary camp site at a date set at about 1300 A.D.—ALEXANDER WETMORE, U. S. National Museum, Washington, D. C., December 9, 1935.

NOTES AND NEWS

The Cooper Ornithological Club will hold its eleventh annual meeting at the Los Angeles Museum, Exposition Park, Los Angeles, Friday and Saturday, April 17 and 18, 1936. The an-

nual dinner will be held Saturday evening, the 18th. Sunday, the 19th, will be devoted to a trip afield. The official hotel will be the Coliseum, at 457 West Santa Barbara Street, near the Mu-

seum. Members may bring interested friends to all the scheduled activities. Call is hereby made for papers for the program; the dead line for filing titles is April 10. All members, whether attending or not, should return their signed "proxies," for presentation at the business meeting.—WRIGHT M. PIERCE, *Chairman of local committee, Box 343, Claremont, California.*

This is the year in which the regular biennial membership roster of the Cooper Ornithological Club will be printed. It is due to appear in the May issue of the *Condor*, which issue will go to press on or before April 15. Correction of address, as it appears on the wrapper of this number, or any other new information properly pertaining to this sort of record, should be sent to Mr. John McB. Robertson, Buena Park, California, who is the officer of the Club having the compilation in charge. Accuracy and down-to-date-ness are features that everyone can help to insure.

Pacific Coast Avifauna number 23 was issued by the Cooper Ornithological Club on February 7, 1936. This number comprises an account of "The Birds of Nevada" (146 pp.). The author, Jean M. Linsdale, has therein drawn from every available source to produce a basic repository of facts—the first available from that interesting state. This new number in the Avifauna series may be had by C.O.C. members for \$2.00 from the Club's business manager, W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, California.

Experimental evidence pertaining to the problem of seed dispersal by birds is found in Mrs. Elizabeth S. Roessler's paper appearing in this issue of the *Condor*. Her well planned tests of viability of seed seeds ingested by linnets admirably illustrate the way in which a vital question may be approached in simple fashion, without elaborate technique. The point may be stressed that close at hand, and in our most abundant species, lie opportunities for significant investigation.—A. H. M.

Ornithologists, especially those residing in western North America, will be interested in the newly appeared "Systema Avium Rossicarum," volume I, by G. Dementiev (Paris, 1935, pp. vi + 288, 8 pls.). By special arrangement of M. Jean Delacour, the sponsor of this publication, copies may be obtained in America at the price of \$1.25 each, plus postage, from Dr. Ernst Mayr, American Museum of Natural History, Central Park West, New York City. The present volume deals with the Accipitres, Striges and Passeres, of which groups 709 species and sub-

species are accorded formal standing. Quite instructive is it to compare the representations, genus by genus, of the birds of Russia, in both Asia and Europe, with those of northwestern America.—J. G.



Fig. 17. Herbert Friedmann, Curator of Birds in the United States National Museum; now at work on the concluding volumes of the "Birds of North and Middle America."

The speed at which new words, or old words with special meanings, may come into general use is of late years amazing. This is in part explainable, of course, as one thinks of the radio as the latest and swiftest agency of wide communication. In connection with the current broadcasting of conservation ideas, doubtless for the most part of great general benefit, phenomenally extensive use is being made of the expressions "game management" and "wild-life management." In these expressions is apparently visualized that kind of management that is practiced by the stockman or the poultreer. And here is a possibly unfortunate connotation. Aside from the question whether truly wild animals *can* be managed without their naturalness being damaged, there is suggested the further point that *if* said management is practiced "successfully," then *are* the animals that yield to such practices any longer *really wild*? It would seem that the term *wild-life management* must involve a contradiction!—J. G.

I have recently learned with sorrow of the death of Charles E. H. Aiken, which took place at Colorado Springs, Colorado, on January 15, 1936. He was born on September 7, 1850, and

was thus in his 86th year. It was Aiken who started me in ornithological collecting. I became acquainted with him while living in Colorado Springs in the winter of 1875. One day in conversation with him I happened to say that I was thinking of going to California in the spring. He said "Why not collect birds for me on the way?" I told him that I did not know how to make bird skins. He said he would show me how. We finally made arrangement by which I collected birds and eggs for him for three years in New Mexico, Arizona and California. He was always helpful and our dealings were pleasant. Two or three years before I became acquainted with Aiken he had been a member of a government party working in east-central Arizona and often spoke of it. I think that was the only long collecting trip he ever undertook.—FRANK STEPHENS, *San Diego, California, February 17, 1936.*

It turns out that the provisions of the recent National Firearms Act, intended to curb the possession of sub-machine guns and similar weapons, apply also to certain types of collecting guns. By definition, "the term 'firearm' means a shot gun or rifle having a barrel of less than eighteen inches in length, or any other weapon, except a pistol or revolver, from which a shot is discharged by an explosive if such weapon is capable of being concealed on the person." Thus, by chance, it becomes by law necessary to register on a special form with the Collector of Internal Revenue such collecting guns as the Marble Gamegetter and some models of the Stevens Pocket Rifle. Lack of compliance brings severe penalty. It is suggested that registry papers be accompanied by a statement that the fact that this law applied to collecting guns has only just been ascertained, since registration is supposed to have been made not later than September 24, 1934.—A. WETMORE, *U. S. National Museum.*

MINUTES OF COOPER CLUB MEETINGS SOUTHERN DIVISION

OCTOBER.—The October meeting of the Southern Division of the Cooper Ornithological Club was held at 8:00 p.m., on Tuesday, October 29, 1935, at the Los Angeles Museum, Exposition Park, Los Angeles, with President Cowles in the Chair and twenty-five members and guests present. Minutes of the Southern Division for September were read and approved. Minutes of the Northern Division for September were read. Applications for membership were presented, as follows: Mr. Charles K. Nichols, 212 Hamilton Road, Ridgewood, New Jersey, and Mr. Jerry E. Stillwell, 7460 San Benito Way, Dallas, Texas,

proposed by W. Lee Chambers; Mr. Norman Ronald Jackson, Camp Verde, Arizona, and Mr. Victor Ralph Kiessling, Box 203, Flagstaff, Arizona, proposed by Lyndon L. Hargrave; Mr. Herbert Buckalew, 120 Marshall St., Millford, Delaware, Mr. Paul H. Cheney, 48 Hartford Road, South Manchester, Massachusetts, Mr. Walter J. Everdam, 9253 Corliss Ave., Seattle, Washington, Mr. Gale Monson, Box 432, Safford, Arizona, and Dr. John W. Sugden, 1743 Yale Ave., Salt Lake City, Utah, proposed by John McB. Robertson.

In announcing the sudden death of Harry S. Swarth, a member of the Club for 39 years, and one whose friendship has been highly valued and whose scientific and literary abilities are widely known and respected, Dr. Loyal Miller moved that in deference to the wishes of the family no resolutions be transmitted, but that the Southern Division place upon its minutes a record of the passing of Mr. Swarth as an appreciation of the great loss that has been sustained by the Cooper Ornithological Club and by the science of ornithology at large. This motion was seconded by Mr. Glassell and unanimously carried. The death of two other Club members, Mrs. Ella H. Ellis and Dr. James J. Parsons, was brought to the attention of members present, and on motion made by Mr. Pierce, seconded by Mr. Glassell, and duly carried, the secretary was asked to write letters to the respective families, conveying the sincere sympathy of the Southern Division of the Club.

Mr. Pierce spoke of the illness of Mr. Clinton G. Abbott, former President of the Southern Division, and on motion made by Dr. Miller, seconded by Mr. Pierce, the secretary was asked to write Mr. Abbott a letter extending the good wishes of his many friends for a rapid return to health and scientific activity.

For inspection and further action by anyone interested, the following were laid on the table: a letter from Mr. Forbes, of Vera Cruz, Mexico, suggesting the possibility of obtaining specimens for interested collectors; a letter from the American Wildlife Institute regarding the conference in 1936 to be held at Washington, D.C., February 3 to 7, inclusive; a magazine, "The Living Wilderness," published by The Wilderness Society, and a letter from them addressed as "A Word to Hikers."

Piñon Jays were reported as having been seen this fall in Claremont, by Mr. Pierce; in Fillmore, Piru, Sespe, and Santa Paula, by Mr. Sidney B. Peyton; in Buena Park, by Messrs. Calder and Robertson; and Mr. Carl Chambers said that the Piñon Jays had also been seen near Sandberg on the Ridge Route. Black Petrels were reported by Dr. Miller as having been seen on August 31 rafting in numbers of thousands on the surface

of the sea half way between San Clemente Island and San Pedro. Recently taken specimens were exhibited of the Least, Wilson, and Black petrels. These birds represented the most northern record for the Least, and the second record from California for the Wilson. A migration route outside the islands was an interesting find made by Dr. Miller during the past summer.

Royal Terns were reported by Dr. McCoy as having been seen at Cardiff on October 11 and 14, and at Ventura on October 21. One Lesser Yellow-legs was seen with two Greater Yellow-legs, a Dowitcher, and a Killdeer near Oceanside on October 14, and 40 Snowy Egrets and 30 American Egrets were noted in a neighboring inlet. Dr. Miller said Royal Terns were present in the San Diego area practically all summer after July 20, and it was his belief that a few of these birds remained at Point Mugu throughout the year. Two White-fronted Geese at Del Rey, in October, were observed by Mr. Platford. Messrs. W. Lee Chambers and Howard Robertson, on a trip into Arizona in late September, saw a flight of fully 500 Swainson Hawks east of Wickenburg. The hawks were feeding on grasshoppers. Six Harris Hawks were noted on the Papago Reservation in southern Arizona. Dr. Miller reported Swainson Hawks as abundant just west of Casa Grande, Arizona, in late April.

After discussion, the motion was made by President Cowles, seconded by Mr. Glassell, and duly carried, that the date this year for the December meeting of the Southern Division be changed from Tuesday, December 24, to Friday, December 27.

Adjourned.—LAURA B. LAW, *Secretary*.

NOVEMBER.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held at 8 p.m., on Tuesday, November 26, 1935, at the Los Angeles Museum, Exposition Park, Los Angeles, with President Cowles in the Chair and twenty-three members and guests present. Minutes of the October meeting were read and approved. Minutes of the Northern Division for October were read. Applications for membership were presented, as follows: Mr. Lawrence E. Hicks, Department of Botany, Ohio State University, Columbus, Ohio, proposed by Mrs. Margaret M. Nice; Mr. Edwin Thor McKnight, 201 I St., N.W., Miami, Oklahoma, and Mr. Karl Snyder Hazeltine, 398 South 12th St., San Jose, California, proposed by John McB. Robertson; Mr. John Welty Handlan, Oglebay Park, Wheeling, West Virginia, Mr. Archibald Weir Bell, 365 South Hoover St., Los Angeles, California, Mr. Frederick B. Philipp, 150 William St., New York, N.Y., Mr. Logan Johnson Bennett, Zoology Department, Iowa State College, Ames, Iowa, and Mr. Fred P.

Roullard, 220 Holland Bldg., Fresno, California, proposed by W. Lee Chambers.

As chairman of the Ways and Means Committee for the next annual meeting of the Cooper Club, Mr. Pierce told of the progress to date toward an interesting program. Relative to the present duck shooting season, Dr. Bishop reported having received a card from the National Association of Audubon Societies suggesting that one see No. 8 of the film "March of Time", as an indication of how ducks have been slaughtered. Mr. Chambers said that Mexico had this year closed its borders against invading duck hunters. Mr. Platford reported seeing quite a few ducks on the Salton Sea Refuge, but not so many as last year. President Cowles said he had been at Salton Sea several times during previous seasons and never failed to see a raft of ducks in deep water at the north end, but this year, when there, he did not see a duck of any kind. Mr. Pierce was at Bear Lake at the first of the shooting season and reported quite a few scaup, the usual run of sprigs, and some ruddys, but in his estimation only one-fifth as many ducks were on the lake as were there a year ago. Inasmuch as it will take several years to develop the proposed water refuges, it is hoped that a continuance of poor bags may discourage hunters and give the remaining ducks a chance. In comparison with the duck situation, the abundance of quail was cited. Mountain Quail in the San Bernardino Mountains have greatly increased, probably due to the closed season last year, Mr. Pierce stated, and President Cowles said he had heard there were more quail at Warner Hot Springs this year than ever before.

In reply to the question asked by Mr. Platford as to the age of geese before mating, Dr. Miller said he had no knowledge, though indications are that they do not mate the first year. Dr. Bishop told of geese used as decoys in Canada that nested in the second year.

Comments on the migration of Screech Owls were asked for by Dr. Miller. He said he had always considered the Screech Owl a sedentary bird but now he was of the belief that we get an autumnal or seasonal drift of these owls. Opinions voiced by other observers were in confirmation of this impression and were to the effect that the Screech Owl does apparently leave home, or its breeding territory, during the winter months. Another query of interest was that of President Cowles who said he had been watching various birds feed on the desert mistletoe and was interested in obtaining information as to the different species that use mistletoe berries for food. Any definite knowledge of birds actually seen feeding on this plant will be appreciated.

Adjourned.—LAURA B. LAW, *Secretary*.

DECEMBER.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held on Friday, December 27, 1935, at 8:00 p.m., at the Los Angeles Museum, Exposition Park, Los Angeles, with fifty-four members and guests present. In the absence of both president and vice-president, Mr. George Willett was asked to preside. Minutes of the Southern Division for November were read and approved. The minutes of the Northern Division for November were read. Applications for membership were presented, as follows: W. S. Long, Springdale, Utah, proposed by Alden H. Miller; Miss Grace McCoskey, State Hospital, Stockton, California, by Susan Chattin; Robert Browne Wallace, Asheville School, Asheville, North Carolina, by J. McB. Robertson; Karl William Haller, R.D. 1, Short Creek, West Virginia, and William Griffin Webb, 2563 Hill Drive, Eagle Rock, Los Angeles, California, by W. Lee Chambers; Miss Marjorie Peyton, R.D. 2, Fillmore, California, by Mrs. Laura B. Law.

A proposal that Major Allan Brooks be elected to Honorary membership was presented by Harry Harris, W. Lee Chambers, George Willett, Laura B. Law, and Louis B. Bishop. The Chair remarked that, following the provisions of the Constitution, no action would be taken upon this proposal until after its second reading. (For text of proposal see minutes of January meeting, Northern Division.)

Mr. Pierce announced that the next annual meeting of the Cooper Club would be held in Los Angeles some time in April, and suggested that it was none too soon for members to make plans for attendance and for contribution to the program. The Chair announced the appointment of the following members as a nominating committee to propose officers for the Southern Division for 1936: Dr. Louis B. Bishop, Messrs. W. Lee Chambers and Wright M. Pierce. Mr. Sidney Peyton reported seeing a pair of Condors, about 500 feet up, sailing over his home in Fillmore at noon today.

The evening's program, "Glimpses of northern Honduras, ornithological and otherwise," was presented by Mr. Frederick H. Test, a graduate student of the University of California at Berkeley. With other students from Purdue University, headquarters were established in the summer of 1933 at Tela, Honduras. Illustrating his talk with motion pictures, Mr. Test gave impressions of the village, its inhabitants, neighboring towns, the surrounding hills, the jungle, and something of the native flora and fauna. During his stay in Honduras a trip was made into the back country to Lake Yojoa. This lake at an altitude of some 2000 feet was a regular paradise for many species of water birds. In out-

lining the birds found in Honduras, Mr. Test said he would divide them into three groups: (1) the birds of the sea and shore, such as ringed plovers, turnstones, pelicans, frigate birds, boobies; (2) birds of the second timber growth, tanagers, seedeaters, grosbeaks, hummers, etc.; (3) birds of the jungle, comprising, among others, the honey creepers, some flycatchers, woodpeckers, trogons, tinamous, and toucans. Mr. Test spoke of how meager was the ornithological knowledge of Honduras as compared even with that of Guatemala and suggested that it would undoubtedly prove a very fertile field for anyone who could get down there for intensive bird study.

Adjourned.—LAURA B. LAW, *Secretary*.

JANUARY.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held on Tuesday, January 28, 1936, at 8:00 p.m., at the Los Angeles Museum, Exposition Park, Los Angeles, with thirty-eight members and guests present and President Cowles in the Chair. Minutes of the Southern Division for December were read and approved. The minutes of the Northern Division were read. Applications for membership were presented, as follows: Jack Sturgeon, 3022 Pleitner Ave., Oakland, Calif., by Hilda W. Grinnell; George B. Saunders, Michigan Dept. of Conservation, Lansing, Michigan; Owen Cecil Furniss, 2203 1st Ave., West, Prince Albert, Saskatchewan, Canada, David Edward Davis, 721 Elmwood Ave., Wilmette, Illinois, Thomas Henry Dodge, Navajo Agency, Fort Defiance, Arizona, and Arthur Skogman Einarsen, Oregon State College, Corvallis, Oregon, by John McB. Robertson; Paul Marshall Rea, Museum of Natural History, Santa Barbara, Calif.; James Lloyd Poland, 526 West Burke St., Martinsburg, West Virginia; Hollis T. Ross, 109 South 3rd St., Lewisburg, Pennsylvania; and Carl William Chambers, 1120 North Ave. 57, Los Angeles, Calif., by W. Lee Chambers.

A letter from the Affiliation Committee of the Pacific Division, American Association for the Advancement of Science, asking for the names of the representatives from the Southern Division, was read. It was moved, seconded and carried that the Northern Division be notified and their representatives be directed to act for the Southern Division also.

In the absence of the other members of the Nominating Committee, Wright M. Pierce announced the following names for officers for the year 1936: President, Luther Little; Vice-president, Laura B. Law, and Secretary, Sidney B. Peyton. It was moved, seconded and carried that the nominations be closed and that

the officers be declared elected. Mr. Cowles turned the gavel over to Mr. Little, and Mrs. Law turned over her duties to Mr. Peyton. Mr. Little made a few remarks and said that he did not intend to take office with any "New Deal" platform; and the regular business continued.

A notice of the meeting of the North American Wild Life Conference, to be held in Washington, D. C., February 3 to 7, 1936, was read. It was moved, seconded and carried that Harold C. Bryant, George Wright, and A. B. Howell be notified that if they attended the meetings they were to act as representatives of the Southern Division.

A minute in memory of John W. Maillard, by J. Grinnell, was read. It was moved, seconded and carried that the Southern Division concur with the Northern Division in this expression. This notice of the passing of Mr. Maillard came as a shock to the older members of the Club, as he was well known to all of them.

Following the second reading of the proposal for Honorary Membership of Major Allan Brooks, it was moved, seconded and carried unanimously that he be duly elected.

Wright M. Pierce spoke on the coming Annual Meeting, the dates to be April 17 and 18, with several field trips planned for Sunday, the 19th for those who cared to take them. The official hotel is to be the Coliseum Hotel at Figueroa and Santa Barbara streets. He urged the members to get their papers ready and to submit the titles and the approximate time of delivery to the committee.

Kenneth Stager told of his recent visit to Mono County, in the vicinity of Bridgeport. About forty species of birds were noted, the most numerous being American Rough-legged Hawks near Bridgeport, and about three hundred Canada Geese on Twin Lakes. Other species were scarce, and no Rosy Finches or Pine Grosbeaks were seen.

Mr. Appleton reported that he had taken a set of Zebra Finches' eggs from an aviary in San Fernando Valley. George Cantwell told of his recent visit to Mexico. Mr. Woods told of his visit to Death Valley and of the birds and mammals noted there. Dr. Miller reported Costa Hummingbirds at Point Mugu in company with Anna Hummingbirds in December; he also had seen them at Indio. Numbers of Black-bellied Plovers also were noted at Point Mugu. Wright Pierce told of the absence of Pifion Jays in their regular haunts in Bear Valley; he also told of two male Anna Hummingbirds apparently fighting, one of them killing the other. Miss Mary Fossler reported on the dissection of a California Brown Pelican. Dr. Wood told of his studies at the Los Angeles Junior College on the blood protozoa from birds trapped by the Micheners.

So far, parasites have been found only in the blood of one Audubon Warbler and one House Finch.

Adjourned.—SIDNEY B. PEYTON, *Secretary*.

NORTHERN DIVISION

DECEMBER.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, December 19, 1935, at 8:00 p.m., in Room 2503, Life Sciences Building, Berkeley, with President Miller in the Chair and about forty-five members and guests present. Minutes of the Northern Division for November were read and approved. Proposals for membership were: Edward Eugene Clay, 1112 Excelsior Ave., Oakland, Calif., by Alden H. Miller; Mrs. Ethel R. Farnsworth, 453 Fairmont Ave., Oakland, Calif., and Ralph H. Imler, 923 First St. South, Stockton, Kansas, by Jean M. Linsdale; Joe T. Marshall, Jr., 1992 Yosemite Road, Berkeley, Calif., by J. Grinnell; Morton Thiemann Swarth, 2800 Prince St., Berkeley, Calif., by H. W. Grinnell. The President announced the appointment of the following committee to nominate officers for the coming year: Cornelia C. Pringle, Ernest I. Dyer, Jean M. Linsdale (Chairman).

Mr. Joseph Grinnell reviewed briefly the new World list, *Systema Avium Rossicarum*, by Buturlin and Dementiev, the latter of the Museum at the University of Moscow. This volume, printed in Paris and issued first in parts from 1933 to 1935, lists 700 species and races of birds occurring in the U.S.S.R. Of especial interest to North American ornithologists are those circumpolar groups of which forms occur both here and in Russia.

Mr. Tom Kirksey reported a flock of 75 Pipits on Hamilton Field, Marin County, and a Belted Kingfisher, on November 17, west of Sacramento. Mr. Jack Sturgeon observed a Pigeon Hawk over central Oakland on December 19. Mr. Walter Moore saw a male Gadwall on Lake Merritt on December 1, and 16 Snow Geese in flight above College Avenue, Berkeley, on December 8. On November 28, at Mano, Mr. Eric C. Kinsey found a Western Tanager in his banding trap.

The evening's talk was given by Mr. Frederick H. Test, now a graduate student at the University of California. In the summer of 1933, Mr. Test was one of a group of students which went from Purdue University to Spanish Honduras. Headquarters were established at Tela, the "model city" of the United Fruit Company, in northwestern Honduras. Here at the edge of the jungle most of the expedition's time was spent; but a brief trip was made to Lake Yojoa, which proved to be an especially fascinating

place for study. About forty species of birds were briefly and interestingly characterized by Mr. Test, and a reel of 16-millimeter film illustrated the talk.

Adjourned.—HILDA W. GRINNELL, *Secretary.*

JANUARY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, January 23, 1936, at 8:00 p.m. in Room 2503, Life Sciences Building, Berkeley, with President Miller in the Chair and about seventy members and guests present. Because the evening's speaker, Mr. Richard M. Bond, had received word which necessitated his leaving for Washington on that night's train, the usual order of the evening was reversed and the business meeting was preceded by the program. Mr. Bond's topic was "Advantages and Disadvantages of Falconry." His impartial account of his own joys and sorrows experienced in rearing, training and losing birds aroused the sympathetic admiration of his audience. Although his hearers caught the speaker's enthusiasm for the thrill which comes when an owner watches his falcon stoop swiftly to its quarry, yet we doubt whether any will have the courage to begin the long apprenticeship which must be served before the tyro becomes a successful trainer of falcons.

Following the program the December minutes of the Northern Division were read and approved and the December minutes of the Southern Division read. Proposals for membership in the Club were: Richard M. Bond, 305 Underwood Bldg., San Francisco, Calif., by E. Lowell Sumner, Jr.; Mrs. Florence R. Connick, 18 Tanglewood Rd., Berkeley, Calif., by Amelia S. Allen; Dana Sperr, 335 Newton Ave., Oakland, Calif., by B. C. Cain; Edwin H. McClintock, 2448 Monticello Ave., Oakland, Calif., Dwight C. Smiley, 612 Underwood Bldg., San Francisco, Calif., and Mrs. Helen M. Steinfeld, 2371 Oak St., Berkeley, Calif., by J. M. Linsdale.

In accordance with a provision of the Club Constitution, the appended proposal for Honorary membership in the Club, having been read at the December meeting of each Division, was given a final reading and a vote called for. On motion of Wm. H. Behle, duly seconded, the name proposed, that of Major Allan Brooks, was unanimously endorsed.

We, the undersigned members of the Northern Division of the Cooper Ornithological Club, hereby propose for Honorary membership in the Club, Major Allan Brooks, of Okanagan Landing, British Columbia, Canada. For thirty years Major Brooks has been a loyal member of the Club; for a much longer period has he been a close student of birds; while his work has lain chiefly in western Canada, his travels have brought him wide acquaintance with birds and bird students throughout the World; pre-eminently has he won universal approval of his talents as bird artist. This last attainment alone, we believe, qualifies Major Brooks for the recognition we propose. Joseph Mailliard, E. I. Dyer, Alden H. Miller, J. Grinnell.

Anticipating similar action by the Southern Division at its January meeting, the Chairman expressed to Major Brooks his own pleasure at the Club's action. The latter responded that he was heartily grateful to his many warm friends among the members of both divisions of the Club for the honor so unexpectedly bestowed upon him.

The following minute in memory of John Ward Mailliard was read by Mr. Joseph Grinnell:

John Ward Mailliard became a member of the Cooper Ornithological Club in 1894, thus in the second year of the existence of our organization. During the forty-two years of his continuous membership, he has been ever loyal in his support of the purposes for which the Club has been maintained. In the earlier years his kindly encouragement of younger members, socially as well as ornithologically, was widely beneficial. His active help in 1912 and 1913 in a certain conservation campaign participated in by the Club went far toward bringing the success attained. His own collecting and study of birds in the 1890's and 1900's, supplementing the activities of his brother, Joseph Mailliard, directly and indirectly contributed importantly to growth in the ornithology of California.

Therefore, concerning the death of John W. Mailliard, on January 9, 1936, it seems proper to place among our permanent records this minute memorializing the facts recited.

The Chairman requested Mr. J. M. Linsdale to report the recommendations of the committee appointed in December to nominate officers of the Northern Division for 1936. Mr. Linsdale replied that it was the unanimous suggestion of the committee that the officers serving in 1935 be retained for a second year. The Chair thereupon asked if there were any nominations from the floor. Mr. Lewis W. Taylor moved that the nominations be closed and the incumbent officers declared re-elected. The motion was duly seconded and unanimously carried. Mrs. Amelia S. Allen, who served as secretary of the Northern Division for eight years, moved that the present secretary be given a vote of thanks for the continued services. It was so ordered.

The following reports from the field were among those given. Mr. D. L. Kraus noted a Ruddy Turnstone near Oakland Airport on December 25, 1935, and on January 12, 1936, a Black-throated Gray Warbler in Faculty Glade. Miss Hope Gladding made a similar report, possibly of the same individual warbler. Mr. John H. Gibson saw a Western Mockingbird near Faculty Glade on December 20, 1935, and a bird of the same species near Sunset View Cemetery on January 18, 1936. Mrs. A. Hillebrand observed a Golden Eagle on January 19, on the Livermore road about two miles from Danville. Mrs. Kelly reported Long-billed Curlews more numerous than usual this winter. Mr. Dexter reported that three or four California Thrashers may be commonly seen near the head of Chabot Road.

Adjourned.—HILDA W. GRINNELL, *Secretary.*

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